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The 2008/2009 World Economic Crisis

What It Means for U.S. Agriculture

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Abstract

The world economic crisis that began in 2008 has major consequences for U.S. agriculture. The weakening of global demand because of emerging recessions and declining economic growth result in reduced export demand and lower agricultural commodity prices, compared with those in 2008. These, in turn, reduce U.S. farm income and place downward pressure on farm real estate values. So far, the overall impact on U.S. agriculture is not as severe as on the broader U.S. economy because the record-high agricultural exports, prices, and farm income in 2007 and 2008 put U.S. farmers on solid financial ground. Moreover, the debt equity ratios in agriculture tend to be more conservative than those in most other sectors of the economy. There is much uncertainty concerning the depth and extent of the crisis. The outcomes for U.S. agriculture depend on whether or not there is a global realignment of exchange rates to correct current macroeconomic imbalances.

Keywords: world economic crisis, U.S. agriculture, U.S. agricultural exports, agricultural commodity prices, U.S. trade-weighted exchange rate, U.S. farm income

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Summary

The 2008-09 world economic crisis has major impacts on U.S. agriculture. Declining incomes around the world as a result of the evolving worldwide recession combined with the short-term appreciation of the dollar result in significant declines in U.S. agricultural exports and sharply lower agricultural prices, farm income, and employment, compared with those in 2007-08. Agricultural households also suffer from declining income from off-farm jobs, as the economic recession in the United States ripples through to rural-based businesses and loss of tax revenue puts pressure on rural government employment and social services. Because the U.S. farm sector went into the crisis with record-high exports, prices, and farm income, the declines, although substantial, will bring agriculture back to trend outcomes. While there is a great deal of uncertainty concerning the full magnitude of the U.S. and global recession, the effects of the crisis are expected to be less severe for U.S. agriculture than for many other sectors of the U.S. economy.

In 2007 and 2008, U.S. net farm income equaled \$87 billion and \$89 billion, respectively, with each year establishing a new nominal record. Even when adjusted for inflation, these amounts reflect the highest net farm incomes since the early 1970s. Depending on assumptions about the extent of the economic downturn, this analysis projects that U.S. net farm income in 2009 could fall by 26 percent to \$66 billion—a level similar to the average of \$65 billion earned in the previous 10 years—and in the worst case scenario to \$60 billion (a drop of 33 percent).

The projected decline in farm income in 2009 is not expected to have much effect on national agricultural land values. Land value trends that emerged in 2008 could continue in States that showed the largest declines in rural housing values and abate in States that enjoyed double-digit increases in land values due to strong crop receipts.¹ The economic crisis could also reduce U.S. agricultural export-related employment in the short run, as projected 2009 employment falls by 13 percent (a loss of 45,000 jobs).

The crisis will impact U.S. agriculture mostly through indirect international effects rather than through changes in the U.S. economy. The slowdown of growth in foreign economies will reduce import demand for agricultural commodities, resulting in lower U.S. agricultural exports and prices for agricultural commodities. Although the crisis originated in the United States, it has spread to the rest of the world and, especially, to large emerging markets, such as China, South Korea, and Mexico. The crisis is also strengthening the dollar against most other foreign currencies, as money throughout the world flows into the United States as a safe haven. In 2008, the net inflow of capital to the United States totaled about \$650 billion. The stronger dollar reduces U.S. agricultural exports by making them more expensive in foreign markets than output by competitors. This analysis suggests that as a consequence of the slowing global economy and the appreciation of the dollar, U.S. agricultural exports could fall from \$117 billion in 2008 to \$96 billion in 2009.

Another feature of the crisis is that declining world economic activity has caused world energy prices to decline precipitously. This will not affect U.S. agricultural producers uniformly. The fall in energy prices has reduced the

¹Rural housing prices declined more than 8 percent in California, Nevada, Florida, and Rhode Island. They declined between 3 and 8 percent in Oregon, Maryland, New Hampshire, and Connecticut. On the other hand, rural housing prices increased in the Dakotas, Kansas, Oklahoma, Texas, West Virginia, and Delaware. See map on page 24.

price and profitability of biofuels, and thereby lowered prices for feedstock crops, especially corn. On the other hand, all producers will benefit from lower input costs implied by reduced energy and fuel prices. This report projects that in 2009, the fuel and energy-related input costs faced by U.S. farmers could decline by 30 percent, returning costs to the levels of 2006. Livestock producers will be net beneficiaries of the energy price drop, as the decrease in crop prices will lower their feed costs.

Macroeconomic forecasters, such as Global Insight and EIU, predict that the U.S. and world economies should stabilize in 2010 and then resume growth in 2011 near the relatively high rates of the early 2000s.² The return to a growing world gross domestic product and consumer income, especially in emerging markets, will lead to a recovery in U.S. agricultural exports. Thus, this report's reference analysis³ projects that by 2013, U.S. net farm income could rise to \$83 billion, though agricultural exports are projected to be only \$93 billion, largely unchanged from the projected 2009 value of \$96 billion because of the higher value of the dollar. The return to growth will also expand demand for energy. This shift suggests that world energy and fuel prices could again increase. Economic growth would partially reverse the effects of the crisis and thereby help producers of corn and other biofuel feedstock crops. Effects on the livestock sector will be positive because of the economic growth but negative because of rising costs for feed and energy.

The main uncertainty for the long run concerns the value of the U.S. dollar compared with currencies of other major trading countries. One possibility is that the dollar will continue to strengthen substantially, especially against the Chinese yuan and currencies of other major emerging markets. Another is that the dollar will weaken, as it did during most of the 2000s before the 2008 crisis. In the first scenario, U.S. farmers will face a stronger dollar, which will reduce the price competitiveness of U.S. agricultural exports. In the appreciating dollar scenario, U.S. net farm income will decline by almost 7 percent to \$83 billion and agricultural exports will drop by 27 percent to \$85 billion by 2013. In the second scenario, the weaker dollar relative to the reference case will strengthen U.S. farmers' competitiveness on world markets. With a weaker dollar, projected net farm income will increase by 19 percent to \$106 billion in 2013 and to \$118 billion in 2017, while agricultural exports will rise to \$120 billion in 2013 and \$134 billion in 2017. The weaker dollar, combined with the return to world growth, will create strong foreign demand for U.S. agricultural goods, which will help keep farm income high.

²There is a lot of uncertainty about exactly how the current recession will play out. While the consensus forecast is for growth to resume by the end of 2009 or early 2010, the severity of recession in most countries has been consistently revised upward during the past year.

³A special analysis was conducted to establish the reference scenario used in this report. This scenario was developed in January 2009, based on U.S. and global macroeconomic conditions at that time.

Introduction

In the years leading up to the economic crisis that began in 2008, the global economy showed strong growth. Over 2001-07, real world gross domestic product (GDP) grew by more than 3 percent a year, exceeding annual growth of 2.7 percent during the 1990s (fig. 1). Emerging market economies, including China, India, and Russia, expanded at an especially high 6 percent a year, in part because of economic reforms enacted over the past two decades. U.S. agriculture benefited from rising world prosperity, which resulted in growth in U.S. agricultural exports to record-high levels and historically high agricultural commodity prices. Combined, these factors contributed to growth of 43 percent in real (inflation-adjusted) farm income over 2000-07 (ERS, 2009b).⁴

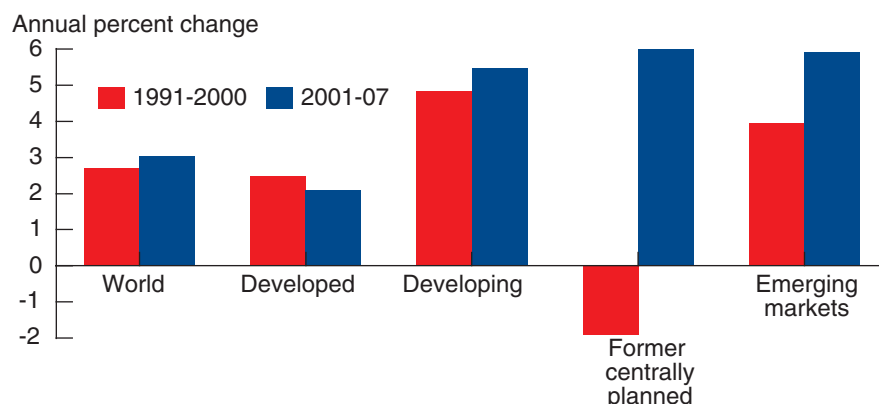
Agriculture has always been a heavily trade-dependent sector. In 2007, the farm share of U.S. economic activity generated by agricultural exports was 27 percent, or nearly \$57 billion. In the same period, bulk commodities accounted for 40 percent of U.S. agricultural exports, and high-value products accounted for 60 percent.⁵ Almost 20 percent of the economic activity generated by high-value exports was attributed to processes done on farms (Edmondson, 2008b).⁶

The financial crisis began in the United States in mid-2007 with increasing interest rate spreads and declining house prices, and in September 2007, the injection of liquidity into financial markets by the Federal Reserve, Bank of England, and the European Central Bank. The financial crisis quickly spread throughout the U.S. economy and the rest of the world and by the second half of 2008 resulted in recessions in numerous countries. How might the financial crisis and ensuing economic recession (hereinafter, the economic crisis) affect U.S. agriculture, especially given that agricultural exports account for around 20 percent of the value of U.S. agricultural production?⁷ To address the question, this analysis uses models to project U.S. agricultural exports, prices, farm income, agricultural employment, and farm real estate values out to 2017. Projections are based on two alternative scenarios that reflect different assumptions about the depth of the recession and alternative outcomes for the value of the dollar compared with the currencies of U.S. major agricultural trading partners.

Figure 1

Real GDP growth rates

Growth imbalance put pressure on resource supplies



Source: USDA, Economic Research Service, International Macroeconomic Data Set.

⁴High world growth also put upward pressure on prices for energy and agricultural goods because resource availability could not be increased quickly enough in the short run. This is one reason why world energy and many agricultural commodity prices increased dramatically in 2007-08 (Trostle, 2008).

⁵Bulk commodities are defined as crops such as corn, barley, wheat, soybeans, rice, and raw tobacco where there has been no processing. High-value products include any agricultural product that has undergone some processing. We usually divide high-value products into intermediate products such as soybean meal and oil, produce and horticulture such as fruits and vegetables, and consumer-ready processed products such as confectionary goods and breakfast cereals.

⁶While not usually considered farming, many farm activities involve processing of farm products where the proceeds go to the farmer. Examples of this include dairy farms that make cheese, vineyards that produce and bottle their wine, fruit farmers that box their fruit for shipment to grocery stores, and farms that transport their products to market.

⁷The share of agricultural production that is exported varies by commodity. For example, between 2004 and 2006, the United States exported around 71 percent of cotton, 50 percent of wheat, and 30 percent of rice, but only 3 percent of beef (see the summary chart in Edmondson, 2008b).

Causes of the Economic Crisis

The 2008/2009 world economic crisis was caused mainly by a combination of world macroeconomic imbalances and severe weaknesses in the U.S. and Western financial system.⁸ Since the mid-1990s, world economic growth has involved major macroeconomic imbalances between two different groups of countries, mainly the United States and Great Britain on one hand and various Asian countries, such as China, South Korea, and Taiwan, referred to as “trade surplus” countries, on the other (see Wolf, 2008; Council of Economic Advisors, 2009). The United States saved less as a share of its GDP and consumed more, compared with the trade surplus countries. At the expense of domestic consumption, the trade surplus countries expanded production and exports and, in the process, accumulated huge holdings of foreign exchange denominated in currencies of their major export markets (especially the United States).

The imbalances became self-sustaining. The United States ran large negative trade balances, and the surplus countries large positive balances (Federal Reserve Board, 2009). The surplus countries, in turn, lent the United States a large share of their accumulated foreign exchange reserves (mostly by buying U.S. Treasury bills). These reverse capital flows helped finance U.S. trade deficits, while at the same time kept the currencies of the trade surplus countries from rising in value (appreciating) against the dollar (Wolf, 2008). The capital inflows lowered U.S. interest rates and increased business investment, boosting GDP, consumption, and imports. The capital inflows also expanded investment in equities and property, which contributed to an asset price boom. The rise in asset prices increased consumer wealth, which further stimulated U.S. consumption spending and imports, and thereby helped sustain the trade deficit.

The large influx of money into the Western financial system enlarged the supply of funds available for loans and investment relative to the profitable opportunities available. This consequence, combined with insufficient government financial regulation and supervision, resulted in investors and banks making riskier loans, such as for subprime home mortgages and mortgage refinancing in the United States. The increase in delinquent loans for U.S. home mortgages in 2007-08 precipitated the U.S. financial crisis, as financial institutions' liability to asset ratios began to deteriorate.

Another cause of the economic crisis was innovative practices used in the financial markets during the 1990s and 2000s, which had the effect of reducing transparency and increasing risk (Lewis, 2008; Council of Economic Advisors, 2009). The securitization (bundling) of different types of loans and development of other new financial products (such as mortgage-backed securities, loan default swaps, and collateralized debt obligations) lowered transparency. To maximize short-run gains, financial firms became highly leveraged by keeping their reserves low relative to the magnitude of funds lent or invested.

As the home mortgage delinquency rate increased, securitization and other derivative products made it difficult for lenders to assess their own exposure and that of potential borrowers to bad debt. After the collapse of the

⁸The evolving dynamics of the current global crisis are remarkably similar to those of previous crises. Global imbalances result in large capital flows to countries, which lead to risky loans and investment. If capital then quickly flows out of countries, it can cause a financial crisis (Shane and Stallings, 1987; Liefert and Shane, 2000).

global financial services firm Lehman Brothers in September 2008, lending among banks and other financial firms was sharply curtailed and interest rate risk premiums rose rapidly. Because financial institutions could not borrow easily from secondary financial markets to raise funds, they had to sell assets. This led to substantial discounting of bonds and rapid price declines in equity markets. All these problems were compounded by financial firms' earlier extreme leveraging of funds. Given the openness of U.S. financial markets and the heavy participation of foreign banks and financial firms in those markets, the U.S. financial crisis quickly spread throughout the world (Krugman, 2008).

As their liability to asset holding deteriorated further, financial institutions became more conservative in their lending practices. This disruption to lending began hurting business investment, the housing market, consumer durable spending (such as for automobiles and appliances), and employment. The drop in asset values (equities, property) throughout the world has sharply reduced consumer wealth, also causing consumer spending to fall. The declines in investment and consumption are driving the current world economic downturn.

Direct Effects of the Economic Crisis on U.S. Agriculture

The economic crisis will have direct and indirect effects on U.S. agriculture. The direct effects will come from changes within the U.S. economy. The indirect effects will stem from the impacts of the crisis on foreign income, trade, and world energy prices.

The direct effect of the crisis on U.S. agriculture is expected to be modest. On the demand side, the crisis is likely to lower U.S. GDP (Global Insight (2009) projects a decline of 2.7 percent in 2009), and thereby consumer spending on food. This demand effect, though, will probably be small. Most U.S. consumers have a sufficiently high standard of living that demand for food is not very sensitive to changes in income.⁹ Consumers are less likely to eat out at restaurants, and an increasing share may choose to shop for food at warehouse outlets. Total consumer expenditures on food (including food away from home) will fall, but the amount of food actually consumed will not. This will likely result in a changing composition of demand for agricultural commodities and products and, thereby, a fall in some agricultural prices. For example, demand may shift from more expensive beef and fish to less expensive meats, such as poultry. Consumers may also reduce purchases of “organic” foods in favor of more “industrial” foods.

On the supply side, the disruption of overall U.S. financial markets could inhibit lending to farmers and agribusinesses. Agribusinesses heavily dependent on credit could be constrained, which, in turn, could lower demand for agricultural inputs. In recent years, farm borrowing has increased from large regional banks, some of which have moved toward riskier lending behavior (FDIC, 2008). Yet, most rural banks that lend to farmers are not closely tied to the financial world that created, and is now suffering from, the financial crisis. Agricultural borrowers and lenders tend to have secure long-term relationships, which should mitigate the crisis’s effect on the flow of loans to farmers.

⁹Some food spending will be affected by the health of the general economy, which, in turn, affects the use of USDA’s food and nutrition assistance programs. Caseloads for the Supplemental Nutrition Assistance Program (SNAP, formerly known as the Food Stamp Program) tend to follow the unemployment rate, a key indicator of the health of the general economy. The relationship is less pronounced for the other food and nutrition assistance programs. In turn, the food assistance programs affect industry and the general economy. Demand for farm and processed food products increases when program spending rises, and SNAP participation grows during economic downturns, which can have a stabilizing effect on the economy (ERS, 2009g).

Indirect Effects of the Economic Crisis on U.S. Agriculture

The main indirect effects of the crisis will come from its impacts on GDP and income in overseas markets, especially in countries that are large importers of U.S. agricultural goods; on energy prices (which are falling because of the decline in world economic activity); and on the exchange rate of the U.S. dollar against foreign currencies. While it has been shown that foreign income and exchange rates are major determinants of levels of U.S. agricultural exports, their impacts on high-value products differ significantly from those on bulk commodities (Shane et al., 2008). U.S. agricultural exports of high-value agricultural products tend to be more sensitive to changes in foreign income growth and less sensitive to exchange rate changes than those of bulk commodity exports.

GDP

The spread of the economic crisis beyond the United States will hurt economic growth throughout the world. Oxford Economic Forecasting (2009) projects that world GDP in 2009 will fall by more than 2 percent. The last time world growth was negative was 1982. Negative world growth in 2009 will be down from a rate of about 2.5 percent in 2008 and the 3-percent yearly average since 1970. Like the United States, many countries are projected to have recessions with declines in GDP. Although demand for food in the United States and other wealthier developed countries is highly unresponsive to changes in consumer income, this is not the case for developing countries. A major contraction in these countries' GDP could cut spending on food and industrial demand for agricultural products substantially. Countries that are large markets for U.S. agriculture could reduce their imports. By the end of 2008, there was evidence that this was already happening in China, Taiwan, Mexico, Egypt, and Russia (FATUS, March 2009).

Just as high world economic growth during the 2000s contributed to the spike in world energy prices in 2007-08, the economic crisis's negative effect on growth is contributing to the drop in demand and prices for energy. After peaking at \$147 a barrel in July 2008, the price of oil plunged to \$32 a barrel at the beginning of 2009 (EIA, 2008; 2009).

The fall in energy prices will have a negative demand-side effect and positive supply-side effect on farmers. The negative effect is that prices for biofuels, and thereby for biofuel feedstocks, will drop, which will impact producers of bulk crops (especially corn in the United States). For example, from July 2008 to January 2009, the price of ethanol decreased from \$2.90 a gallon to \$1.61 (ERS, 2009a), and the price of corn correspondingly dropped from a peak of over \$7 in summer 2008 to less than \$4 in January 2009. A positive effect for agriculture is that prices are also likely to decline for energy-based agricultural inputs, such as gasoline, diesel, and electricity. Decreasing natural gas prices are also likely to put downward pressure on fertilizer prices. For U.S. bulk crop producers, energy-based inputs can account for half to two-thirds of operating costs, and one-sixth to one-third of total costs (ERS, 2009b).

The drop in energy prices will not affect all U.S. agricultural producers uniformly. All farmers will benefit from the price decrease for energy-based inputs. Yet, crop producers who sell biofuel feedstock will see their output prices fall and will probably be net losers (just as they were net gainers from the surge in energy prices over 2007-08). On the other hand, producers of meat and other livestock products will especially benefit, as prices will decrease not only for their energy-based inputs but also for their animal feed.

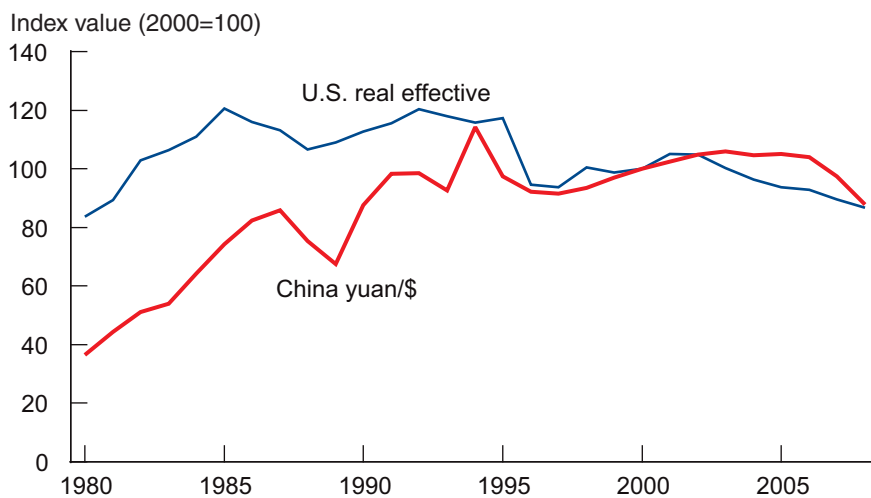
Exchange Rate of the Dollar

Another major indirect effect of the world economic crisis on U.S. agriculture will be the degree to which the value of the dollar reacts against the currencies of developing countries that are large importers of U.S. agricultural goods. Predicting this effect is challenging.

As discussed earlier, one of the main causes of the economic crisis was the macroeconomic imbalances that accompanied world growth, in particular that the United States saved too little and consumed too much, compared with the trade surplus countries of Asia. These imbalances could be corrected by a realignment of exchange rates involving an appreciation of the surplus countries' currencies against the dollar. This would raise the prices of their exports in the United States and lower the prices of U.S. exports in their countries. U.S. imports and consumption would fall and exports to trade surplus countries rise, while trade surplus country exports would drop and their imports and consumption rise. The U.S. trade deficit would shrink. In the early and mid-2000s, exchange rates in fact moved in this direction. For example, between 2005 and 2008, the dollar depreciated against the Chinese yuan by 18 percent in real terms (after correcting for inflation) (fig. 2); between 2001 and 2007, it depreciated against the South Korean won by 40 percent (real terms); and between 2002 and 2008, the dollar fell in real terms against all foreign currencies by 17 percent.¹⁰

¹⁰A depreciation of the dollar also results in rising real U.S. interest rates and the crowding out of domestic investment, as a larger share of domestic saving must finance the U.S. fiscal deficit.

Figure 2
China's and U.S. real exchange rate
China's real exchange rate has appreciated since 2005



Note: Indexes are calculated based on foreign currency per U.S. dollar.
 Source: USDA, Economic Research Service, International Macroeconomic Data Set.

Yet, the crisis's shortrun effect on the dollar has been to appreciate it rather than depreciate it against the Chinese yuan and most other currencies. Although the crisis originated in the United States, financial investment here (whether in U.S. government securities or bank financial instruments) is considered less risky than in most other countries, so money throughout the world is seeking a safe haven from uncertain conditions around the world. From July to December 2008, the dollar appreciated overall in real terms by 17 percent (ERS, 2009d), and ERS projects that in 2009, the dollar will increase in real terms by a further 5 percent.

The inflow of funds to the United States has the benefit of helping the U.S. government finance the policies needed to stimulate the economy, to the advantage of the entire world. On the other hand, the dollar appreciation is delaying the correction of the world macroeconomic imbalances that helped spawn the economic crisis. The dollar is appreciating against the currencies of most other countries, developed as well as developing. This means the appreciation is making U.S. agricultural exports less price competitive than output produced not only by importing countries but also by exporting competitors, such as Canada, Australia, and Brazil.

If the United States has a comparative advantage in the structure of its capital markets, then a relatively weak global economy in the intermediate term is likely to result in continued capital inflows and appreciation of the dollar. This would suggest a greater need to balance the fiscal budget in the long term so that foreign savings go into private capital markets. These developments eventually would lead to lower interest rates, higher investment, and incentives for foreign savings to go to other world markets.

This study investigates two longer term scenarios involving the dollar's exchange rate. The first is that the dollar continues to appreciate against the currencies of other countries with which the United States has large trade deficits. Trade surplus countries continue to invest the dollars they earn from their U.S. positive trade balance back into the United States. By keeping the dollar strong, this behavior would prevent market forces from eliminating the U.S. trade deficit through dollar depreciation. In this scenario, the world could rebound from the economic crisis, with the U.S. financial system strengthened, though with the same general patterns of growth and trade as before. U.S. agriculture would benefit from resumed world growth, but without the benefit that could have come from dollar depreciation.

In this dollar appreciation scenario, the macroeconomic imbalances between the United States and the trade surplus countries go uncorrected for the long run as well as for the short run. The scenario carries the risk of an equally or even more serious economic crisis in the future. The crisis could be sparked not by weaknesses within the world financial system but rather by worries about the post-recovery sustainability of the dollar's value, which might trigger large-scale capital flight from the United States. The United States could have an economic crisis similar to that of various emerging market economies during the last 15 years, such as Thailand and Indonesia in the late 1990s, which could pull down the entire world economy.

The second scenario is that the dollar depreciates against the trade surplus country currencies. Trade surplus countries reduce their investment of excess dollars accumulated from U.S. trade into the United States, which results in a depreciation of the dollar and a declining U.S. trade deficit. The low dollar scenario would result in a significant reduction of global macroeconomic imbalances and could lead to sustainable world economic growth. In this scenario, U.S. agriculture would benefit doubly from renewed world growth and dollar depreciation, both of which would increase foreign demand for U.S. products and also put upward pressure on agricultural commodity prices (see box, “Uncertainty Concerning the Economic Crisis”).

Uncertainty Concerning the Economic Crisis

Economists and others continue to be uncertain as to the length and depth of the economic crisis both in the United States and abroad. Forecasts of the crisis’s effect on GDP in the United States and other countries are being revised downward on a monthly basis. One reason for the uncertainty is that the forecasts are based on models that assume that markets work well, if not perfectly. Key features of the financial crisis are that information about credit risk is difficult or impossible to obtain, and confidence in U.S. and world financial markets has eroded. Consequently, these markets are working poorly, which hurts all other economic activity.

Another element of uncertainty is the degree to which the decline of confidence in the economy will reduce consumer spending. A “paradox of thrift” could occur whereby the apparently prudent decision of individual households to consume less and save more creates a downward spiral of falling consumer demand, which lowers GDP, employment, and income, which reduces spending. The longrun correction of the world macroeconomic imbalances that helped create the economic crisis requires that consumers in the United States and certain other countries consume less and save more. Yet, too strong an adjustment in that direction in the short run could deepen the economic crisis. This point is also relevant for assessing model-based macro forecasts of the crisis’s impact on consumption spending and GDP. Consumers’ actual propensities to consume and save could be changing currently from the parameter values measuring these behaviors that are embedded in the models.

Another element of uncertainty is whether the Asian trade surplus countries that (unlike the United States) have had large savings will begin to spend more of their accumulated wealth. If and when this happens, it would have an expansionary effect on production and income growth around the world, to the benefit of U.S. agricultural exports.

Model Projections of the Crisis's Effects on U.S. Agriculture

This ERS analysis uses a number of different modeling frameworks to generate the full set of projections. The Oxford Global Macroeconomic Model is used to produce a consistent set of macroeconomic assumptions for the various scenarios. The ERS PEATSim modeling framework of world agricultural trade incorporates the implications of these assumptions to generate projections for the crisis's effects on U.S. and world agricultural commodity markets: world agricultural prices, production, consumption, and trade (see boxes, "Oxford Global Macroeconomic Model" and "ERS PEATSim Model"). The ERS models for U.S. farm income, agricultural employment, and real estate values then use the PEATSim results to generate projections for those variables.

Model projections are first presented for the crisis's impact on U.S. agricultural exports and world prices, and then on U.S. farm income, agricultural employment, and real estate values. The degree to which the crisis affects

Oxford Global Macroeconomic Model

The Oxford Economic Forecasting Global Macroeconomic model is a quarterly dynamic international econometric model. It covers 76 countries, with primary models for 44 countries and secondary models for 32 others. Data are imbedded in the model for a wide variety of macroeconomic variables going back to 1970, and the model generates projections out to 10 years. The model is updated every month, and a new base projection is run. For major countries such as the United States, the underlying database contains about 450 variables. For secondary countries, the variable coverage is smaller. The model is designed to be user friendly.

The Oxford model is used to generate the projected values of countries' GDP, exchange rates, inflation rates (as measured by the consumer price index), GDP deflator, the world price of oil, and interest rates, which are then entered into USDA's PEATSim model. The various macroeconomic scenarios are produced by changing a key variable, computing a new solution, and comparing the new results with those of the base run (the reference scenario). Charting and tabling tools are available to evaluate the scenarios.

The macroeconomic assumptions used in all three projection scenarios (including the reference scenario) differ from those that underpin the *USDA Agricultural Projections to 2018*, which means that the projections made in this report for U.S. agricultural exports, prices, and other market effects also differ from those in the *USDA Agricultural Projections to 2018*. The macroeconomic assumptions for the USDA baseline were made in October 2008, while the assumptions for this report were made in January 2009, when the empirical evidence indicated that the world economic crisis would be more severe than was thought in mid-autumn 2008.

ERS PEATSim Model

The Partial Equilibrium Agricultural Trade Simulation model, or PEATSim, is a dynamic, partial equilibrium, multicommodity, multiregion global gross trade model of the agriculture sector. It uses supply and demand equations to capture the economic behavior of producers, consumers, and markets in a global framework. It includes variables for production, acreage, yields, consumption, exports, imports, stocks, world prices, and domestic producer prices. Identities such as supply and utilization, consumption, and its components hold for all commodities and regions in the model. The model calibrates each country's agricultural activities to USDA's long-term projections (USDA, 2008). The model balances global supply and demand. Prices are determined at levels that permit global market equilibrium to be achieved.

PEATSim covers 37 agricultural commodities: 12 crops—rice, wheat, corn, other coarse grains, soybeans, sunflowers, rapeseed, peanuts, cotton, other oilseeds, tropical oils, and sugar; 12 oilseed oil and meal products—from soybeans, sunflowerseed, rapeseed, cottonseed, peanuts, and other oilseeds; 4 livestock products—beef and veal, pork, poultry, and raw milk; 6 dairy products—fluid milk, butter, cheese, nonfat dry milk, whole dry milk, and other dairy products; and 3 biofuel commodities and byproducts—ethanol, biodiesel, and dried distillers' grains.

PEATSim includes 13 countries or regions—the United States, the European Union, Canada, Mexico, Japan, South Korea, Australia, New Zealand, China, Brazil, Argentina, India, and the rest of the world (ROW).

PEATSim can model country-specific trade and domestic policies. It is written in GAMS (General Algebraic Modeling System) and uses a Mixed Complementarity Problem (MCP) solver that allows it to handle different production-consumption regimes and functional form discontinuities. The model's innovative and flexible specification enables it to analyze a variety of scenarios. Model solutions provide information on changes in prices, consumption, production, imports, and exports.

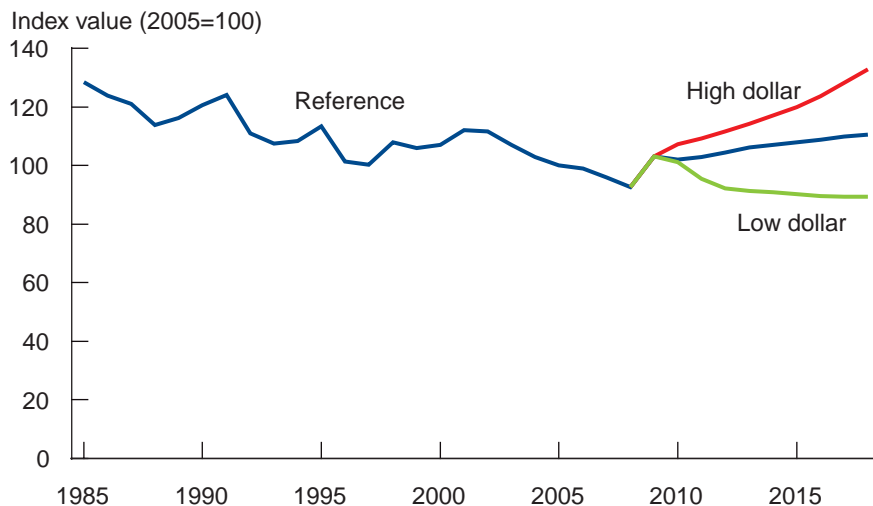
U.S. agriculture—farm income, employment, and real estate values—will be driven by the impacts of the crisis on U.S. agricultural exports and the demand for biofuel feedstocks.

Reference projections are made from 2009 to 2017. Both short- and longrun projections are discussed. The short run is defined as the next 1-3 years (2009-11). The crisis's projected effects depend on assumptions made for the future values of key macroeconomic variables, such as countries' GDP, exchange rates, inflation rates, and the world price of oil. Because of the uncertainty concerning the future path of the value of the dollar (appreciation versus depreciation), this analysis makes different assumptions concerning the dollar's future exchange rate (fig. 3). These assumptions generate different scenarios for the crisis's effects on U.S. agriculture.

Figure 3

The U.S. trade-weighted exchange rate under alternative scenarios

Exchange rate changes are important for U.S. agriculture



Source: USDA, Economic Research Service (ERS), International Macroeconomic Data Set; ERS projections.

In the reference scenario, it is assumed here that the dollar appreciates moderately after 2009 in real terms over both the short run and the long run, with total real appreciation from 2008 to 2017 of around 19 percent.¹¹ This compares with a dollar appreciation of 89 percent between 1975 and 1986 (ERS, 2009c). Current world macroeconomic imbalances between the United States and the trade surplus countries of Asia are not corrected.

In the high dollar scenario, the dollar appreciates substantially in real terms from 2008 to 2017 by 39 percent. The macroeconomic imbalances not only persist but become more severe. In the low dollar scenario, the dollar depreciates in the next 3-4 years, more than countering the shortrun appreciation in the second half of 2008, and then more slowly to 2017, with total depreciation from 2008 to 2017 being 4 percent. Continued dollar depreciation in this scenario helps correct global macroeconomic imbalances.

When the dollar exchange rate is changed in the high and low dollar scenarios, the Oxford Model is used to readjust all the other macroeconomic variables affected by the exchange rate, such as GDP growth and inflation for the United States and other countries. The set of macro assumptions entered into PEATSim in each of the dollar scenarios therefore is based on and consistent with the specific values of the dollar exchange rate used in that scenario.

U.S. Agricultural Exports and Trade Prices

Short Run

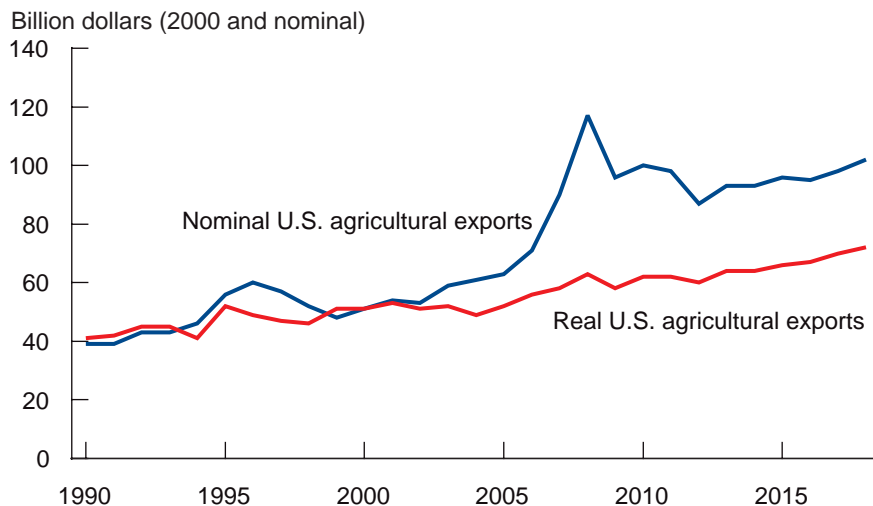
In the reference scenario in the short run, U.S. agricultural exports fall in value in nominal terms by 18 percent, from \$117 billion in 2008 to \$96 billion in 2009 (fig. 4). However, the drop in real terms (2000 constant prices) is lower at 7 percent. U.S. agricultural exports fall because of decreasing

¹¹A change in the real, as opposed to nominal, value of the dollar is calculated by adjusting the change in the nominal value by the difference between the inflation (or deflation) rates in the United States and its trading partners.

Figure 4

U.S. agricultural exports and projections

Nominal exports decline while real exports increase after the crisis



Source: USDA, Economic Research Service (ERS) using USDA's Foreign Agricultural Trade of the United States database; ERS projections.

world demand. This is the result of both negative world GDP growth and declining price competitiveness on world markets because of the appreciation of the dollar.

By 2011, however, export prospects improve. Table 1 provides export projections for four major crops and three meats. In the reference scenario, the projected export volume is higher for four of the identified commodities in 2011 than in 2008. Only soybeans show 2011 exports projected substantially below those of 2008. Table 1 also provides projections for the high and low dollar scenarios. The high dollar scenario predictably shows lower exports, and the low dollar scenario shows higher exports. For the crops, the deviations from the reference scenario volumes are not more than 5 percent in any

Table 1

U.S. exports to the world by commodity group by selected years

Commodity groupings	Reference scenario, millions of metric tons				High dollar scenario, % deviation from reference			Low dollar scenario, % deviation from reference		
	2008	2011	2013	2017	2011	2013	2017	2011	2013	2017
Wheat	25.9	26.4	26.5	26.6	-0.9	-2.9	-5.1	4.2	1.8	1.1
Rice	3.1	3.7	3.9	4.3	-3.0	-3.8	-11.5	2.7	6.7	6.6
Corn	54.6	58.4	58.5	65.0	-0.1	-0.1	-13.0	2.7	2.5	1.4
Soybeans	24.6	19.7	19.6	18.9	-4.3	-6.4	-8.0	4.7	9.1	17.6
Beef and veal	0.8	0.9	1.0	1.2	-1.7	-0.9	-5.5	1.5	4.5	4.9
Pork	1.4	1.2	1.3	2.0	-23.2	-35.7	-76.4	31.7	70.7	57.3
Poultry	2.9	2.5	2.6	3.0	-11.9	-19.3	-63.6	12.4	32.5	37.9

Source: USDA, Economic Research Service, PEATSim results.

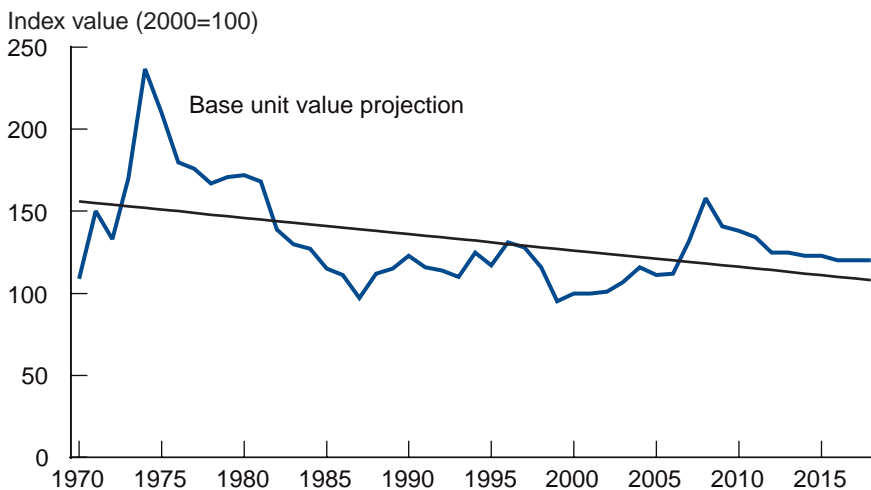
case. For pork and poultry (though not for beef and veal), deviations in the high and low dollar scenarios are much greater. These results demonstrate that world demand for U.S. exports of meat are much more sensitive to changes in the dollar's value than is world demand for U.S. crop exports (or more generally, they show that world demand for meat is more price elastic than demand for crops).

Figure 5 provides the reference scenario projections for U.S. agricultural export prices (or more specifically, U.S. export unit values, which are export values divided by export volumes.) From 2009 to 2012, export prices fall to a nontrivial degree. The export price decline again reflects the crisis-induced fall in world demand for U.S. agricultural exports in the short run. Table 2 provides commodity-specific evidence of the price drop, as prices in 2011 for most of the commodities in the reference scenario are below those in 2008. The table also reveals the degree of sensitivity of world prices to different values for the dollar exchange rate. In the high dollar scenario, world prices are about 5-6 percent lower than in the reference case, while in the low dollar scenario, they are about 5-6 percent higher.

Long Run

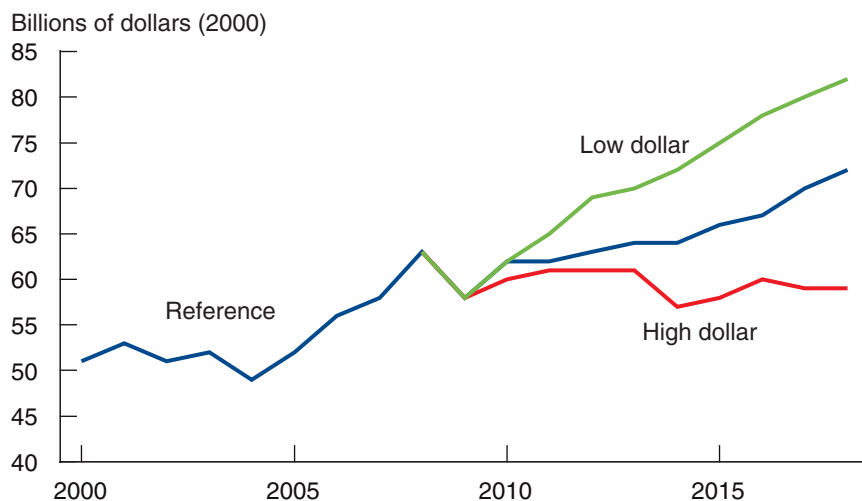
Projected U.S. agricultural exports in the long run rise in both the reference and low dollar scenarios to \$98 billion and \$137 billion in 2017, respectively (fig. 6). In the high dollar scenario, exports decline to \$68 billion in 2017. The divergence between the high and low scenario projections again reveals the sensitivity of U.S. agricultural exports to the dollar exchange rate. As shown earlier in table 1, similar to the short run, pork and poultry exports (though excluding beef and veal) are much more responsive to exchange rate changes than crop exports.

Figure 5
Real U.S. agricultural export unit value
Agricultural prices move back toward trend values



Source: USDA, Economic Research Service using United Nations Food and Agriculture Organization, Agrastat database and U.S. Bureau of Labor Statistics, *BEA End Use Export Indexes, Agricultural Foods, Feeds and Beverages, Excluding Distilled Beverages*; ERS projections.

Figure 6

Real agricultural exports and scenario projections*Exchange rate effects can be substantial*

Source: USDA, Economic Research Service (ERS) using USDA's Foreign Agricultural Trade of the United States database and United Nations Food and Agriculture Organization, Agrastat database; ERS projections.

In the long run, U.S. agricultural export unit values (the proxy for prices) continue to fall but at a lower rate than over 2009-12 (see fig. 5). By 2017, in both the high and low dollar scenarios, projected world prices for all commodities deviate from the scenario projections by 16-20 percent—in the high dollar case downward, and in the low dollar case upward (table 2).

Changes in the U.S. dollar exchange rate generally affect meat exports more than crop exports. Yet, crops can still be strongly impacted in the long run. For example, both the U.S. soybean export volume and real price drop significantly in 2009 (figs. 7 and 8). After 2009 in the low dollar scenario,

Table 2

Projections for trade prices under alternative exchange rates

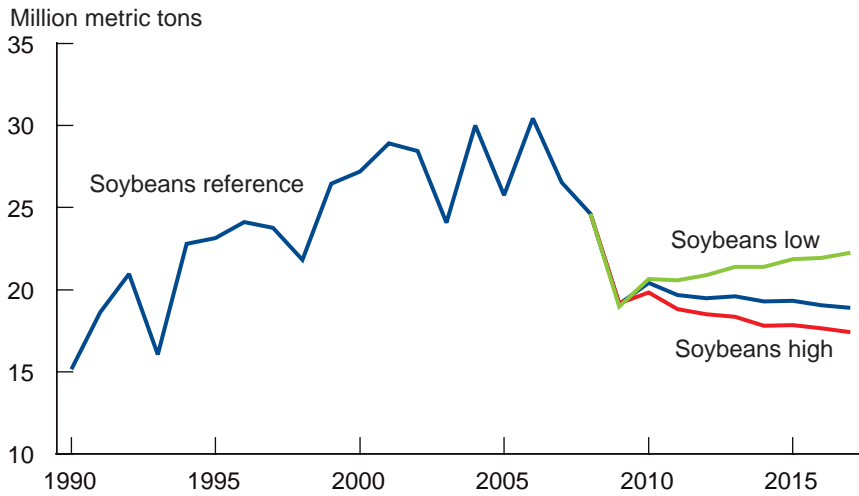
Commodity groupings	Reference scenario, <i>dollars per metric ton</i>				High dollar scenario, <i>% deviation from reference</i>			Low dollar scenario, <i>% deviation from reference</i>		
	2008	2011	2013	2017	2011	2013	2017	2011	2013	2017
Wheat	214	156	146	142	-5.8	-5.1	-18.8	5.9	17	19.2
Rice	281	281	276	287	-6.2	-5.4	-19.6	5.4	16.5	18.2
Corn	155	127	118	114	-5.8	-3.3	-18.4	5.4	17.3	18.9
Soybeans	363	305	282	269	-6.1	-4.9	-16.9	6.1	17.1	21.4
Beef and veal	892	764	699	638	-5.5	-5.1	-19.3	5.4	15.4	19.4
Pork	1,226	1,253	1,170	1,090	-4.7	-4.7	-17.5	5.1	14.1	16.0
Poultry	1,316	1,214	1,124	1,063	-5.2	-3.9	-17.3	4.8	14.6	17.1

Note: 2008 prices are actual.

Source: USDA, Economic Research Service, PEATSim results.

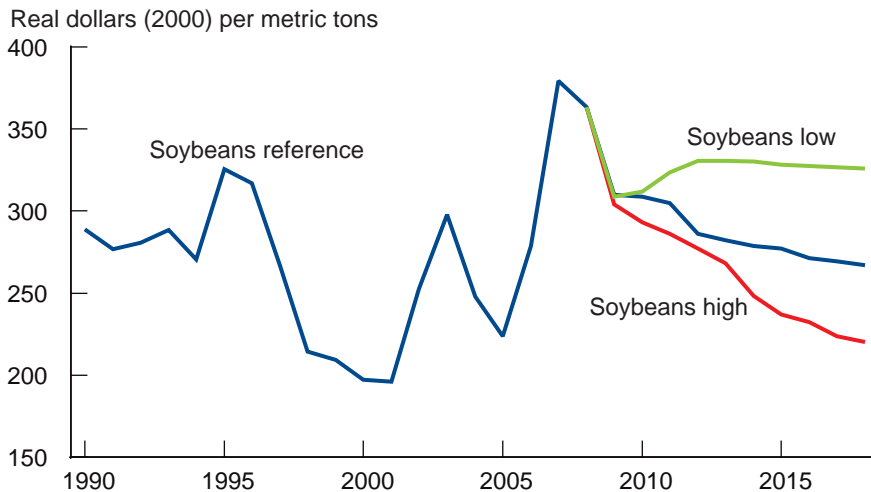
the soybean export volume rises through the projection period, while the real price increases and then decreases slightly. However, in the reference scenario, both the export volume and price fall continuously, and in the high dollar scenario, they fall substantially. By 2017, the projected soybean export volume and real price in the low dollar scenario is 28 and 48 percent higher, respectively, than those in the high dollar scenario.

Figure 7
Real soybean exports under alternative scenario
Soybean exports have come under increasing competitive pressure



Source: USDA, Economic Research Service, Agricultural Baseline Database and PEATSim simulations.

Figure 8
The real soybean price under alternative scenarios
The soybean price is hit hard by the crisis



Source: USDA, Economic Research Service, Agricultural Baseline Database and PEATSim simulations.

Farm Income

Short Run

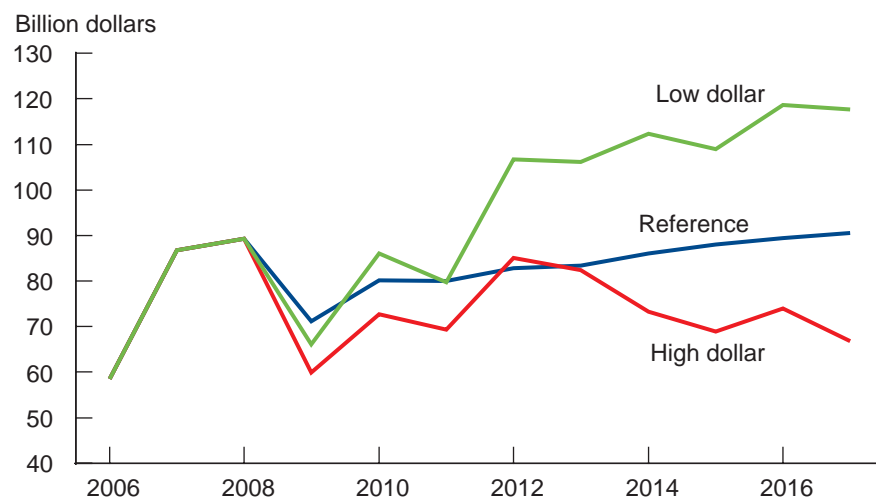
The economic crisis puts downward pressure on farm income in the short run. In the reference scenario,¹² net farm income is projected to fall from \$89 billion in 2008 to \$71 billion in 2009, a drop of 20 percent (fig. 9). This decline is from record-high income, so the level in 2009 is still \$6 billion above the average annual farm income over 1999-2008 of \$65 billion. Net cash farm income¹³ is projected to decline from 2008 to 2009 by 17 percent to \$77 billion (fig. 10).

In the high dollar scenario, lower exports cause farm income to fall because receipts decline faster than expenses. Total expenses are forecast to be slightly higher than the reference case, with greater reductions in fuel and interest expenses being offset by higher feed costs. Because of lower receipts, net farm income in 2009 declines to \$60 billion. This is a drop of about a third from 2008 and \$11 billion below the reference case. Net cash farm income decreases to \$64 billion in the same period.

The livestock sector suffers the most, with receipts projected to be almost 8 percent below the 2009 reference projection of \$135 billion, and crop receipts about 1 percent under the 2009 reference projection of \$162 billion. Milk and dairy cattle account for most of the decline in livestock receipts—which for dairy producers involves additional contraction beyond an already bleak 2009 outlook in the reference case. A more severe downturn in the U.S. and world economy than was projected in USDA (2009) is expected to further dampen U.S. milk and dairy product sales and dairy exports, driving down dairy product and milk prices to levels not reached since 2000-03.

In the low dollar scenario, net farm income decreases from 2008 to 2009 by 26 percent to \$66 billion, and net cash farm income declines to \$71 billion.

Figure 9
Net farm income
Exchange rate scenarios make a difference to farm income



Source: USDA, Economic Research Service.

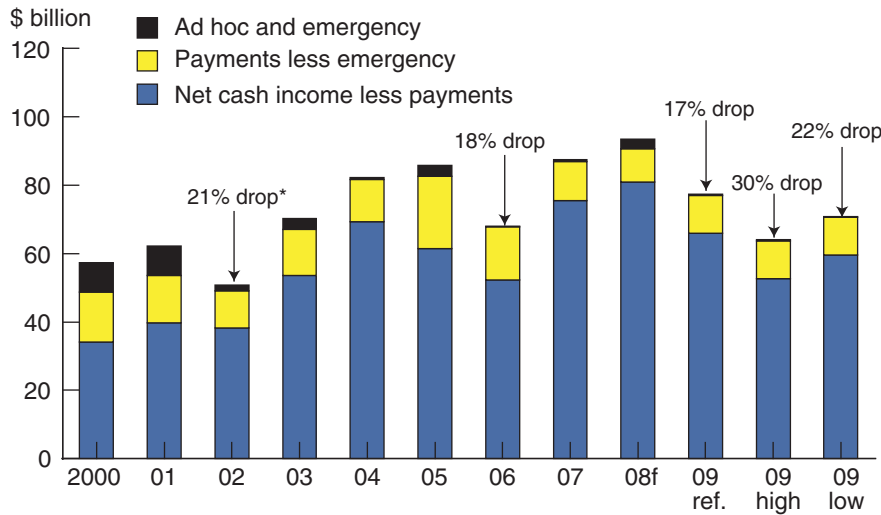
¹²Note that projected 2009 net farm income and cash income in the reference case are above the levels projected in both the high and low dollar scenarios. The reason is that the reference scenario is based on macroeconomic assumptions (such as GDP growth and exchange rates) made in October 2008, while the high and low dollar scenarios are based on macro variable assumptions made later in January 2009, when the world economic outlook was bleaker.

¹³Net cash income is a measure of cash available to farmers to meet expenditures and service debt. Net farm income reflects only the earnings from production that occurred in the current year.

Figure 10

Net cash income and farm payments

Exchange rate scenarios make a difference to farm income



*The percentage change from the prior year. f = forecast.

Source: USDA, Economic Research Service.

The dollar is weaker, interest rates higher, and foreign inputs, such as fertilizers, more expensive. Compared with the 2009 scenario results, commodity receipts change very little, and expenses are more than 2 percent higher.

Tighter cash margins over the course of the U.S. and world recession will impact debt repayment ability for some farmers. The most severe effects are expected for dairy farms for which relatively large reductions in cash earnings are projected. In 2007, 5 percent of dairy farms had debt repayments problems, and in the reference scenario, that figure could more than double to 13 percent. In the high dollar scenario, repayment problems could jump to more than one in five for dairy farm businesses.

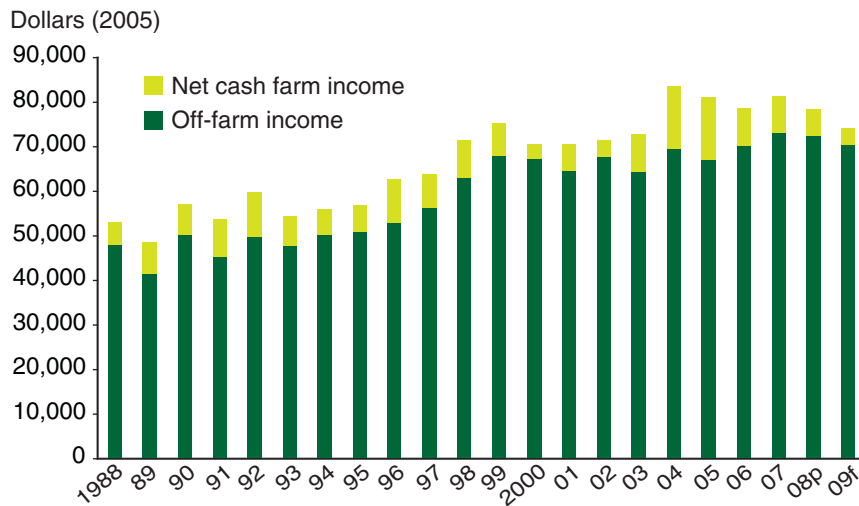
Farm Household Income

Farm household income comes from two sources—income earned specifically from farming and that obtained from off-farm activities and sources. ERS projects that average farm operator household income in 2009 will be \$85,140, down from both the 2007 estimate of \$86,223 and the 2008 preliminary estimate of \$86,864. In real dollars, this becomes \$74,107, \$81,207, and \$78,438, respectively (fig. 11). Yet, in every year since 1996, average farm household income has exceeded average U.S. household income. In 2007, for example, the difference was 27 percent. Farm household income is higher than the national household average even if income from farming is excluded. For farm operator households, average income exceeds median income because of the large share of high-income households in the population. In 2007, average (mean) income was \$86,223, compared with a median of \$52,455.

Over 2003-08, the average annual share of farm earnings in farm household income was only about 12 percent (though it fluctuated from a high of over

Figure 11

Average real farm operator household income, by source



p = preliminary. f = forecast.

Source: USDA, Economic Research Service using USDA's Agricultural Resource Management Survey and U.S. Bureau of the Census, *Current Population Survey*.

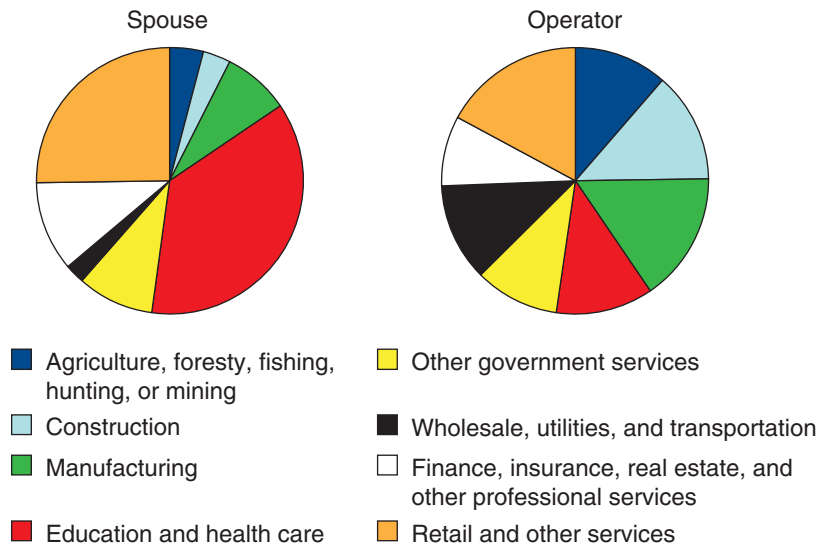
17 percent in 2005 to 7.5 percent in 2008). The share could fall in 2009 to 5 percent, as ERS forecasts that average household earnings from farming will drop to \$4,144. Although the contribution of farm earnings to farm household income is small, its volatility makes income for farm households more unstable than for households in general.

During the economic crisis, the off-farm income earned by farm households will be more stable than farming income. In 2007, about three-fifths of off-farm income came from wages and salaries earned by farm operators and their spouses.¹⁴ Of the major sectors in which farm operators and their spouses are employed, the two that will probably be the most adversely affected by the economic crisis are manufacturing and construction (fig. 12). In 2007, these activities generated 29 percent of wage and salary income for farm operators, though only 11 percent for their spouses. Employment in retail, other private sector services, health, education, and other government services will be more stable during the crisis than work in manufacturing and construction. In 2007, these activities produced 39 percent of wage and salary income for farm operators and 71 percent for spouses. Thirteen percent of off-farm income in 2007 came from steady pensions and government transfer payments (such as social security). The average income of farm households, the dominance of off-farm income in their total income, and the relative stability of employment in the activities that earn most of the off-farm income will all help buffer farm households from the shocks of the economic crisis.

The sources of farm household income, and the share of off-farm earnings in that income, vary considerably by size of farm. ERS does not forecast farm household income by farm size. Yet, the latest estimates (for 2007) show that household income sources differ significantly depending on the size of farms (fig. 13).

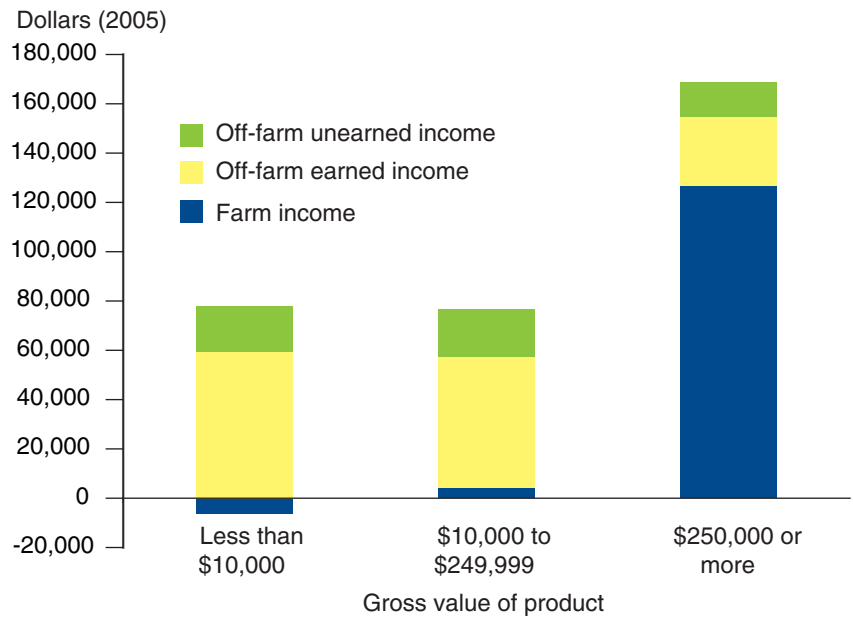
¹⁴Three-quarters of off-farm income comes from wages and salaries and off-farm businesses. Retirement and other transfer income makes up about 13 percent of farm household income, with most coming from public sources. Other important sources of income include interest and dividend income. The ERS forecast of 2009 off-farm income is based on the latest available forecasts of 2009 U.S. gross domestic product and labor compensation as of the release date, February 12, 2009 (see www.ers.usda.gov/briefing/wellbeing/farmhouseincome.htm).

Figure 12
Industry of wage and salary jobs, operator and spouse, 2007



Source: USDA, Economic Research Service using USDA's Agricultural Resource Management Survey.

Figure 13
Real farm operator household income, by size of farm, 2007



Source: USDA, Economic Research Service using USDA's Agricultural Resource Management Survey.

The large majority of U.S. farms are small, and more than 20 percent have no marketable agricultural production (and thereby earnings) in any given year. On the other hand, in 2007, 5.7 percent of farms accounted for three-quarters of total farm sales. Also in 2007, 92 percent of farm households had farm sales under \$250,000. These households had average total income below \$80,000 and earned little income from their farms. The other 8 percent of farm households in 2007 (with farm sales above \$250,000) had average

household income of nearly \$180,000, with the bulk from farm earnings. Although the majority of farms are small and generate little income, they hold significant net worth in their land and other farm assets. Their owners' future economic welfare depends not on farm earnings but on farmland values (see box, "Crisis Impacts of U.S. Farm Land Values"). The economic crisis could also affect U.S. agricultural commodity program costs in the short run (see box, "Crisis Impact of U.S. Commodity Program Costs").

Long Run

Farm income is expected to begin to recover in 2010. Yet, the projected strength of the recovery varies considerably across the three exchange rate scenarios. In the reference scenario, net farm income increases by 11 percent to reach \$80 billion. The high dollar scenario has a larger relative increase (22 percent) but starts from a much lower 2009 projection and only reaches \$73 billion. In the low dollar scenario, net farm income exceeds the reference case in 2010 by \$6 billion, hitting \$85 billion.

Macroeconomic conditions have a significant impact on projected farm income growth after 2012 (see fig. 9). A return to high world income growth expands U.S. agricultural exports, and in the low dollar scenario, exports receive the further boost of enhanced price competitiveness on world markets. Projected farm income rises to \$90 billion by 2017 in the reference scenario and to a substantial \$118 billion in the low dollar scenario. In the high dollar scenario, exports become less price competitive, and projected 2017 farm income falls to \$67 billion. This scenario, in particular, demonstrates how important the exchange rate and exports are to farmers' bottom lines.

ERS does not project farm household income beyond one year into the future (in this case 2009). The bulk of farm household income earned off-farm (from operators and spouses combined) comes from nontrade-dependent activities (construction, retail, wholesale, health, education, and other private and public services). Consequently, the longrun future path of the dollar exchange rate will affect off-farm income much less than farm income. A post-crisis return of the U.S. GDP growth rate to pre-crisis levels therefore should also largely restore off-farm income to pre-crisis levels, regardless of what happens to the exchange rate.

Agricultural Employment

The economic crisis is affecting U.S. employment in the short run, and projected 2009 agricultural export-related employment is expected to fall by 13 percent (a loss of 45,000 jobs) (Edmondson, 2008a). In the longrun reference scenario, projected employment drops by 51,000 jobs over 2008-17. The employment effects in the high and low dollar scenarios are understandably larger. In the high dollar scenario, agriculture loses 110,000 jobs over 2008-17, compared to a loss of 13,000 jobs by 2017 in the low dollar scenario. The U.S. economy supported almost 116 million jobs in August 2008, and by February 2009 lost more than 4 million, leading to a current unemployment rate of 8.1 percent. Although the changes in agricultural export-related employment are small in number relative to those of the entire U.S. economy, the job (and corresponding income) shifts would be substantial for agriculture and rural America.

Crisis's Impact on U.S. Farmland Values

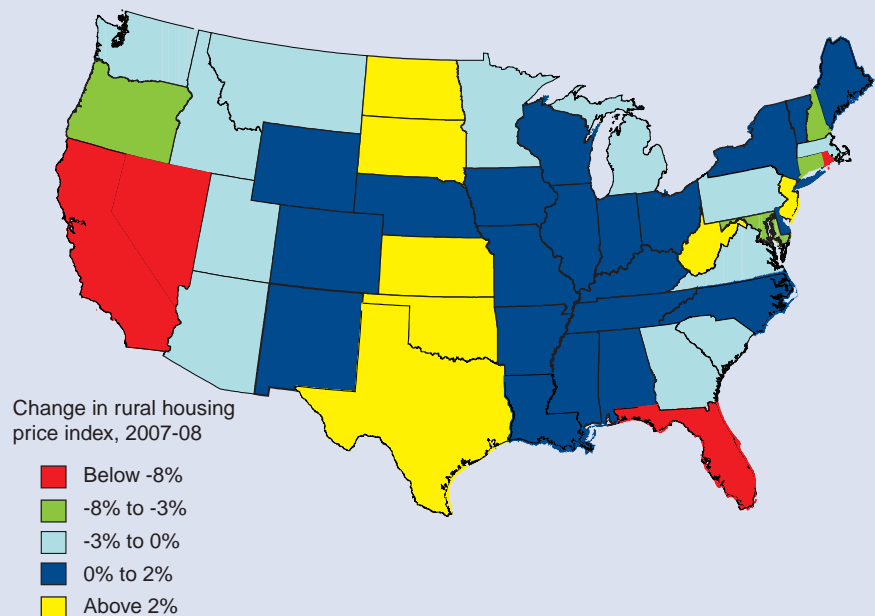
The economic crisis will also impact farmland values. Although factors unrelated to agricultural returns affect farmland values to some degree, farm profitability, interest rates, and the inflation rate have had much stronger influence in recent years. At the national level, farm real estate values are projected to fall in 2009 by about 2 percent in the reference case.

Beginning in 2008, certain areas of the United States experienced greater relative adjustment in land values. In several Northeastern States, where nonagricultural factors influence farm real estate more heavily than in other States, farm real estate values have dropped by 2 to 5 percent. In other States, such as California, Florida, and Nevada, which have been experiencing a contraction in the rural housing market, there has been no growth, or even a drop, in values. States where corn and soybeans constitute a major share of agricultural production have seen double-digit increases in land values because of the biofuels expansion. In the high dollar scenario, where prices and receipts for corn and soybeans fall below those in the reference case, land values in such States as Illinois, Indiana, and Minnesota are expected to moderate in 2009. Farmland in these areas is still viewed as a viable counterinflationary investment, and any downward pressure could be buoyed by demand from large pension funds and institutional investors.

Farm real estate values are not very sensitive to short-term changes in the returns to agriculture. The main reason is that, as with any asset, the value of farmland should equal the discounted value of the expected future streams of income earned from owning the asset. The major factor that drives changes in farm real estate values is the underlying long-term expectation of returns. Since this changes only slowly, farmland values tend to be relatively stable compared with other aspects of U.S. agriculture. Even so, over the projection period, the annual growth rate in farmland values returns to 5 percent in nominal terms and 3 percent in real terms. This is a big shift from the 12-percent annual growth rate in the value of U.S. farm real estate during 2004-08, adjusted for inflation.

Concerning the long-term impact of the crisis on farm real estate values, there is a substantial difference in value at the end of the projection period between the high and low dollar scenarios. Farm real estate values in the high dollar scenario are projected to be \$264 billion less than those of the low dollar scenario by 2017.

Changes in rural housing prices by State



Source: USDA, Economic Research Service using data from Office of Federal Housing Enterprise Oversight.

Crisis's Impact on U.S. Commodity Program Costs

The 2008 Farm Act provides three price-dependent programs—marketing loans, counter-cyclical payments (CCP), and average crop revenue election (ACRE) payments—for program crops. (The program crops include wheat, feed grains, soybeans, minor oilseeds, rice, upland cotton, peanuts, and pulse crops.) The table provides USDA Baseline projected market prices and commodity program price triggers for five major program crops. With the exception of prices for upland cotton, prices in crop years 2009/10 and 2010/11 should remain well above marketing loan rates and CCP effective target prices, indicating that program costs for the marketing loan and CCP programs would be minimal. Program costs are likely to be incurred for upland cotton, with prices projected near the marketing loan rate and well below the CCP effective target price. Any price reductions due to the crisis, particularly in the high dollar scenario, would raise these program costs. Cotton program costs averaged almost \$2 billion per year in 2002-07.

The impact of the financial crisis on participation in the ACRE program and costs for the program is less clear. Producers can elect to participate in ACRE beginning in 2009. Once they elect ACRE, they must remain in the program through the 2012 crop year. They also must give up 20 percent of their direct payments and have their marketing loan rates cut by 30 percent. If it is assumed that yields per planted acre are similar to the 5-year Olympic average (the yearly average after dropping both the highest and lowest year values) used for ACRE, then ACRE payments would be based on price movements. Using the price projections in the table, comparison of 90 percent of the 2-year average price used for ACRE suggests that this program would be an attractive option for producers of wheat, rice and soybeans. If producers elect ACRE, the 20-percent reduction in direct payments will be partially offset by ACRE payments. Once again, any crisis-related price reductions would raise potential costs of this program. However, any fall in commodity prices in a year would reduce the 2 year average price used to determine ACRE payments in subsequent years, thereby lowering payments.

Commodity program crop price triggers

Item	Years	Wheat	Corn	Rice	Soybeans	Upland cotton
		<i>Dollars*</i>				
Price	2009/10	5.75	4.00	12.50	8.85	0.5000
	2010/11	5.60	3.90	11.45	8.75	0.5500
Marketing loan rate	2009/10	2.75	1.95	6.50	5.00	0.5200
Counter-cyclical payment effective target price	2009/10	3.40	2.35	8.15	5.36	0.6458
90 percent of ACRE 2-year average price	2009/10	5.98	3.65	13.19	8.71	0.4950
	2010/11	5.65	3.56	13.05	7.77	0.4500

*Dollars per bushel (wheat, corn, and soybeans) per hundredweight (rice), and per pound (cotton).

Note: Assumes USDA price projections. Lower prices in 2009/10 would reduce the effective ACRE price guarantee.

Source: USDA, Economic Research Service.

Resiliency of U.S. Agriculture

There are a number of reasons why U.S. agriculture may be in a relatively strong position to withstand the temporary shocks that will result from the current financial uncertainty and unfavorable economic climate. In addition to greater involvement in world markets, other important differences exist between today's agriculture and the sector that endured its last major financial crisis more than 20 years ago. Farmers now have a wider range of risk management tools, such as leasing, contracting, renting, crop insurance, hedging, and direct government payments, to share market and financial risks. Farmers today produce higher valued products as a result of technological improvements in agricultural production and food processing systems, as well as have better information on changing consumer preferences. Technological advances have also spurred productivity growth through higher yields. Farmers have improved control over their operations, spend more on management services, and increasingly adopt cost-saving technologies such as hybrid seed, water-saving irrigation platforms, and electronic yield-monitoring devices.

Farmers emerged from the last credit crisis in agriculture more conservative in their use of debt financing. Many more farmers now pay cash for land, equipment, and inputs. Farmers are also reducing their debt load by leasing assets such as land and machinery. Farm lending has shifted from being based mainly on collateral to giving more consideration to borrowers' ability to service debt. Farm sector debt-to-equity is projected to be below 10 percent in 2009 and has not exceeded 20 percent since the late 1980s. It would take a 40-percent reduction in asset values to reach 20 percent debt-to-equity, or a combination of a 30-percent increase in debt and a 30-percent reduction in asset values. The largest annual reduction in farm real estate values since 1970 was 12 percent in 1984. The largest annual increase in debt was 19 percent in 1979.

Conclusion

The emerging global economic crisis has major impacts on U.S. agriculture. As the global recession takes hold, global income falls and demand for agricultural imports from countries around the world declines. That drop in global income combined with the shortrun appreciation of the dollar will lead to substantially lower U.S. agricultural exports in the short to medium term. These developments in turn will reduce agricultural commodity prices, lower farm income and employment, and put downward pressure on agricultural real estate values. Agricultural households will suffer from declining income from off-farm jobs, as the economic recession in the United States ripples through to rural-based businesses and loss of tax revenue puts pressure on rural government employment and social services.

On the positive side for U.S. agriculture, the sector went into the crisis with record-high exports, prices, and income. Consequently, the effects of the crisis will be less severely felt by agriculture than by many other sectors of the U.S. economy.

The main long-term issue is how and whether the fundamental imbalances that created the conditions for the global crisis will be reduced or maintained. This process will depend to a large degree on whether exchange rates are realigned. If, in the longer term, the dollar and other trade deficit countries' currencies depreciate, then imbalances will be reduced and economic growth will resume at sustainable rates. If exchange rates are not realigned, then the trade and savings imbalances will remain.

This study's high and low dollar scenarios represent the resolution of these imbalances and to a large degree depend on how exchange rates are realigned. The consequences for U.S. agriculture of this long-term outcome are profound. If the long-term outcome is a depreciated dollar and the fundamental realignment of global exchange rates, then U.S. agriculture will be strengthened by increases in agricultural export volumes, agricultural commodity prices, and farm incomes. If the long-term outcome is an appreciation of the dollar but no fundamental realignment of exchange rates, the high dollar will become a constraint on U.S. agricultural exports, dollar-denominated agricultural commodity prices, and farm incomes.

In the long run, sustainable world growth depends on getting the balance right between economic growth, agricultural output, and resource availability. That balance depends on technological advances that result in discovery of new and alternative energy sources, efficiency gains in the production and use of energy, agricultural science (such as genetic engineering), and other primary resources. Given agriculture's control of a major part of U.S. land resources, much of the new developments in energy (such as wind turbines and solar technology) will require use of current farmland. Technological breakthroughs, such as horizontal drilling, will also increase oil and natural gas production on agricultural land, thereby raising royalty income paid to farm households. Farmers will continue to be suppliers of feedstocks for biofuels. Technological gains in the use of water, treatment for pests, and other technologies will positively affect yields. Efficiency gains in the

production and use of energy will also have major impacts on agricultural production, since energy-related inputs are the largest single cost to farmers.

To the degree that the current crisis results in a rebalancing that supports the development of new agricultural and energy technologies, the longer term outlook is that U.S. agriculture will continue to be a major participant in the changing structure of the economy. In such a world, agriculture would continue to provide a plentiful supply of food at reasonable prices.

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