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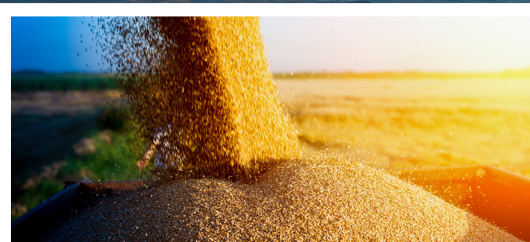
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# Economic Crises and U.S. Agricultural Exports

William M. Liefert, Lorraine Mitchell, and Ralph Seeley





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# **Economic Crises and U.S. Agricultural Exports**

William M. Liefert, Lorraine Mitchell, and Ralph Seeley

## **Abstract**

During the past few decades, economic crises have become commonplace, affecting both developing and developed countries and often hitting a number of countries simultaneously. These crises typically reduce the impacted countries' imports, including agricultural products. Given that the United States is a major agricultural exporter, its farm sector is particularly vulnerable to such crises. Examination of past crises and a simulation exercise of the effects of possible future crises show that such shocks can reduce U.S. agricultural exports considerably, especially if a crisis hits a number of countries simultaneously rather than a single country alone, as happened in the 1997-98 East Asian Crisis and 2008-09 world financial/economic crisis. In 1998 and 2009, agricultural imports from the United States by the major foreign markets struck by these crises fell collectively by 16 and 17 percent, respectively.

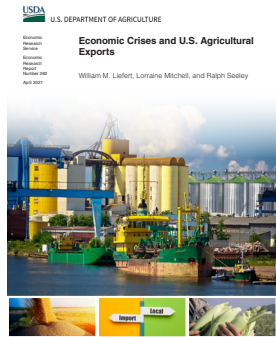
**Keywords:** agricultural trade, U.S. agricultural exports, economic crises, financial crises, exchange rates.

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# Economic Crises and U.S. Agricultural Exports

William M. Liefert, Lorraine Mitchell, and Ralph Seeley

## What Is the Issue?

A large share of U.S. agricultural output is exported, and economic crises in the foreign markets for these exports have been a common event during the past few decades. Economic crises in foreign markets can reduce their agricultural imports, which in turn can lower U.S. agricultural exports, production, and farm income. These crises can hit both developing and developed market economies, and the world economy is vulnerable to crises that simultaneously affect multiple countries. Examples are the East Asian Crisis of 1997-98 (which coincided with a major economic crisis in Russia), the world financial/economic crisis of 2008-09, and the evolving world coronavirus (COVID-19) crisis of 2020-21. In developing countries and emerging markets, the triggers for economic crises include a fall in the world price of a major commodity export—such as oil—or debt problems, while in developed countries, macroeconomic and financial imbalances and weaknesses are often the root cause.

## What Did the Study Find?

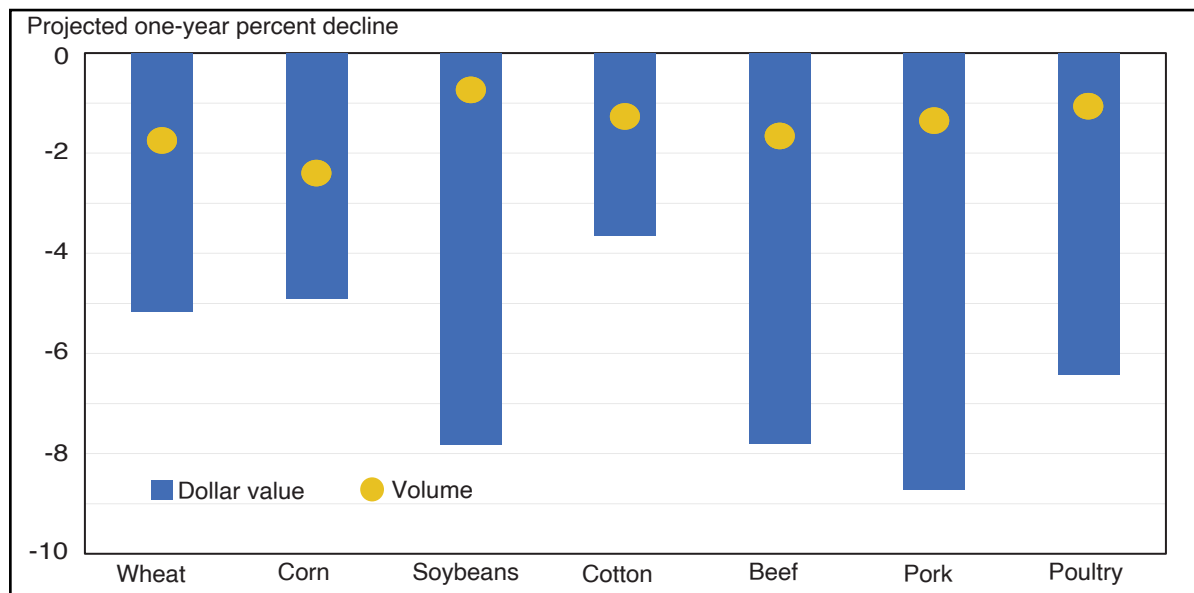
Economic theory predicts that an economic crisis will typically reduce a country’s agricultural imports (as well as total imports) in two main ways: lowering gross domestic product (GDP) and national income, which decreases the demand for imports; and depreciating the country’s currency, which reduces demand for imports by making them more expensive relative to domestically produced, substitute products. The empirical results of this study find that during past crises, countries’ agricultural imports declined substantially, including those from the United States.

In the East Asian Crisis of 1998, major foreign markets hit by the crisis collectively reduced their agricultural imports from the United States by 16 percent (measured in current U.S. dollars). In the world economic crisis year of 2009, the drop in agricultural imports from the United States by the major foreign markets hit by the crisis was collectively 17 percent. The examination of past crises also supports the economic argument that because the demand for food is less responsive to changes in income and price than most other types of goods, the drop in countries’ agricultural imports during an economic crisis is usually less than that of imports overall.

Projections using a USDA, Economic Research Service (ERS) model of world agricultural trade show that a future concurrent crisis in the 8 top U.S. foreign agricultural markets (as of 2016-17) would decrease U.S. exports considerably. Assuming that a crisis decreases countries’ gross domestic product by 5 percent and depreciates their currency by 10 percent relative to the dollar, this study projects that a simultaneous crisis in these 8 countries would lower the total value of U.S. exports of grain and oilseed products by 6.8 percent, and that of meat by 7.3 percent, not just to these 8 countries, but worldwide. The crisis would reduce the value of pork exports by a projected 8.7 percent and that of beef and soybeans by 7.8 percent.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

## Simultaneous future crises in major foreign markets would reduce U.S. agricultural exports



Note: The figure gives the projected percent decline in export values and volumes if a crisis were to hit simultaneously the 8 largest foreign markets for U.S. agricultural exports (in 2016-17; Canada, Mexico, China, the European Union (which includes the United Kingdom), Japan, South Korea, Indonesia, and Taiwan). A crisis is characterized by a 5-percent fall in the importing countries' gross domestic product and a 10-percent real depreciation of their currency against the dollar, and the export effects are for one year of crisis.

Source: USDA, Economic Research Service projections using ERS Country-Commodity Linked (CCL) model.

As expected, the projections reveal that U.S. agricultural exports are more negatively affected when multiple foreign markets simultaneously experience an economic crisis, as opposed to when only a single country does so. One reason is that when multiple foreign markets are hit, the volume of U.S. exports falls by more than with a single-country crisis. In addition, the collective decrease in these countries' demand for imported agricultural products reduces the prices received by U.S. exporters. The projections (and figure above) show that with multi-country crises, U.S. export values fall mainly because of declines in trade prices. Given that an export value equals the volume exported times its trade price, the fact that the export values drop by a substantially greater percentage than export volumes reveals that the trade prices of the commodities decrease by a larger percentage than the trade volumes.

The cause of the COVID-19-generated world economic crisis is different than the origins of the previous economic crises examined in this report, and the economic challenges facing most countries in the world from the pandemic also differ in some ways from those crises. One dissimilarity is that COVID-19 has not only delivered shocks to the demand side, but also to the supply side, such as disrupting supply chains. However, the COVID-19-related economic effects most countries are experiencing include a major decline in GDP and consumer income, and for some countries, currency depreciation in relation to the U.S. dollar. Although the COVID-19 world economic crisis is still in sway and its full impact on U.S. agricultural exports is not yet known, the crisis-induced drop in countries' GDP has had the isolated effect of reducing U.S. agricultural exports. Because of developments unrelated to COVID-19 that pushed exports up, U.S. agricultural exports in 2020 did not fall but rather rose by 7 percent. However, based on the discussion in this report, it appears that without the COVID-19-generated world economic crisis, U.S. agricultural exports in 2020 would have been higher.

### How Was the Study Conducted?

Economic theory is used to identify how an economic crisis is likely to affect a country's agricultural imports. The study then applies that theory to examine empirically the degree to which past economic crises in foreign markets for U.S. agricultural products have lowered their agricultural imports, in total and specifically from the United States. An ERS model of world agricultural trade is then employed to simulate how possible future crises in key U.S. foreign markets might reduce their agricultural imports, again in total and specifically from the United States.

# Economic Crises and U.S. Agricultural Exports

## Introduction

This report examines the effects of economic crises within countries on their agricultural imports, in particular from the United States. Such crises typically have broad macroeconomic consequences, including a contraction in economic output and household income and depreciation of the country's currency. These effects can reduce the country's imports. The United States is a major exporter of agricultural products, with a large share of the sector's output sold abroad. Over the period 2008-16, exports accounted for 20 percent of the total market for U.S. agricultural production (ERS topic page). Therefore, economic crises in foreign markets can be a major source of instability for U.S. agricultural exports and, consequently, for the income and welfare of U.S. farmers, ranchers, growers, and food processors.

Claessens and Kose (2013) note that the fact that crises are widespread and may affect many sectors of the economy makes it difficult to define them with just one or two conditions or indicators. Throughout this report, we use the term “economic crisis” to mean the combination of the initial economic/financial troubles and ensuing macroeconomic effects. However, given that the focus of this report is on how economic crises in foreign markets affect U.S. agricultural exports, in our empirical work, we more narrowly define an economic crisis as existing when both a country's gross domestic product falls and its currency depreciates.

The report begins by examining the causes of economic crises. It then conceptually investigates how an economic crisis typically impacts a country's imports. The report then examines how the major multi-country crisis of 1997-98 (the East Asian Crisis) and the world financial/economic crisis of 2008-09 affected the agricultural imports of specific countries—both developed and developing—especially their imports from the United States. The examination draws on ERS studies by Langley (2000) and Shane et al. (2009) that analyzed how these two major world economic crises would impact U.S. agriculture. The report concludes by examining how potential future crises could affect the agricultural imports of major U.S. foreign markets, and U.S. exports to them. For the analysis, we use the ERS model for world agricultural production, consumption and use, and trade to generate projections for these variables based on specific macroeconomic assumptions about the values of countries' GDP and exchange rate.<sup>1</sup>

Shane et al. (2008) examine how the change in GDP (income) and the exchange rate in major foreign markets affected U.S. agricultural exports over the period 1970-2006. The study finds that a 1-percent rise in U.S. trade partners' GDP increased U.S. agricultural exports by 0.75 percent, while a 1-percent depreciation of their currencies against the dollar decreased U.S. agricultural exports by 0.5 percent.

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<sup>1</sup>The 8 U.S. foreign markets included in the analysis are Canada, Mexico, China, the European Union (which includes the United Kingdom), Japan, South Korea, Indonesia, and Taiwan.

An economic crisis might affect agricultural imports differently than imports as a whole because food is a necessity, such that demand for it is less responsive to income and price changes relative to most other consumer purchases. Our examination of past economic crises and simulation exercise involving possible future crises show that these macroeconomic shocks do decrease agricultural imports, but by less than for imports in the aggregate. However, the results also indicate that these outcomes do not hold for all agricultural products in all countries.

We also find that the value of U.S. agricultural exports falls more when a crisis simultaneously hits all of its major foreign markets rather than an individual country for two reasons: the total export volume of specific commodities drops by more, and the collective decline in world demand for the exported products reduces their trade prices. In addition, our results show that most of the crisis-driven decrease in the value of U.S. agricultural exports occurs because of the fall in export prices rather than export volumes.



## Causes and Import Effects of Economic Crises

Many of the economic crises experienced by countries during the last three or so decades originated in, or at least strongly involved, financial sectors, such that the term “financial crisis” has often been used to describe these shocks. Claessens and Kose (2013) and Reinhart and Rogoff (2014) examine the causes and nature of financial crises. These crises often involve the following conditions and developments that challenge countries’ financial systems: credit booms, high public debt (private and public, and often resulting from credit overexpansion), and asset price bubbles (often fueled again by credit growth). Unsustainable credit and debt and the popping of asset price bubbles can trigger a series of events, including a reduction in lending and investment and capital flight from the country.

Preexisting weaknesses within countries’ banking systems and other financial institutions can exacerbate the stresses caused by these adverse developments. If a number of large countries concurrently experience a financial crisis, then ripple effects can occur in international capital and goods markets that transmit the crisis to other countries.

The International Monetary Fund (IMF) identified 99 countries that experienced some level of financial crisis between 1997 and 2012. These include many hit by the East Asian Crisis of 1997-98 and the world financial crisis of 2008-09, as well as other single countries whose crises were not part of larger world-wide troubles, such as Russia in 1998 (the simultaneity of its crisis and the East Asian Crisis being largely a coincidence) and Argentina in 2001-02.

A typical macroeconomic effect of a financial crisis is falling GDP. This can result from the loss of wealth (as measured by the value of financial assets), a decline in capital investment and business confidence, and capital flight, all of which decrease aggregate demand within the country, and thereby national output and income. If a country is a major exporter to many large foreign markets simultaneously hit by crisis, its GDP could fall because of decreased exports to those nations. The following examples indicate the degree to which countries’ GDP have declined during crisis periods: Indonesia experienced a 13.1-percent fall in GDP in 1998; Russia a 5.3-percent drop in 1998; and Argentina an 18.4-percent decrease during 1999-2002. During the world financial/economic crisis of 2008-09, GDP fell in Japan, Mexico, and the European Union (28) by 5.4, 5.3, and 4.3 percent, respectively (2009 compared to 2008; ERS International Macroeconomic Data Set).

Another common macroeconomic effect of a financial crisis is the depreciation of the country’s currency. This can result from the decline in capital inflows and a rise in capital outflows as credit, investment, and wealth move to countries with more favorable financial and macroeconomic climates. If large crisis-hit nations reduce imports from a country, the ensuing drop in demand for its currency can generate depreciation. The following are examples of countries whose currency depreciated against the U.S. dollar in *real terms* during crisis periods (that is, adjusted for any price inflation that occurred within the crisis periods): Indonesia in 1997-98 with depreciation at 62 percent; South Korea in 1997-98 at 38 percent; Russia in 1998-99 at 46 percent; South Korea in 2008-09 at 24 percent; and Mexico in 2008-09 at 14 percent (ERS International Macroeconomic Data Set).

Developing countries (or emerging markets) that rely heavily on the export of just a few commodities—such as energy, metals, or agricultural goods, or even a single export, such as oil in the case of Venezuela—can also be vulnerable to a distinct type of economic crisis caused by a major fall in the world price of those products. This adverse development reduces GDP by lowering the income

earned by exports, and usually depreciates the currency by decreasing world demand for it because fewer units of the currency are now needed to purchase a given volume of the country's exports.

Both declining GDP and currency depreciation typically reduce a country's imports, including agricultural products. Falling GDP coincides with declining consumer income, which lowers the demand for agricultural and food goods, whether domestically produced or imported. Currency depreciation increases the prices that consumers must pay for imports expressed in domestic currency, which motivates them to decrease their import demand by switching to domestically produced substitutes. As mentioned earlier, Shane et al. (2008) estimate that a 1-percent currency depreciation against the U.S. dollar by major trading partners reduced U.S. agricultural exports to them by 0.5 percent. Devadoss et al. (2014) find that the devaluation of the yuan against the dollar caused Chinese imports of U.S. agricultural goods to fall and U.S. agricultural imports from China to rise. Kohler and Ferjani (2018) calculate that a 1-percent increase in the value of the Swiss franc reduced exports by 0.8-0.9 percent.

An ERS study by Valdes, Hjort, and Seeley (2020) examines how changing macroeconomic circumstances affect Brazil's agricultural exports. The study finds that currency depreciation increases exports—as expected because it makes Brazilian goods less expensive to foreign purchasers—and that economic growth within the country has the isolated effect of decreasing exports. This latter effect occurs because increased domestic demand for agricultural goods reduces the surpluses available for export. A simulation exercise that also uses an ERS model for Brazilian agriculture, part of the agency's world modeling system discussed earlier, also supports these results. Although the specific focus of the Valdes, Hjort, and Seeley study is different from ours, the analysis it uses linking macroeconomic developments and trade is similar to what we employ in this report, and its empirical trade results are consistent with what our analysis predicts.

# The Effects of Past Economic Crises on Countries' Agricultural Imports

We first examine how the East Asian Crisis of 1997-98 affected various countries' agricultural imports, including from the United States. Given that the single-country Russian economic crisis of 1998 coincided with the larger multi-country crisis, we also include Russia in our analysis. For all the countries we examine (identified in table 1), the crisis reduced GDP in 1998—or in the case of China substantially lowered its growth—and depreciated the currency, especially against the U.S. dollar, in real (inflation-adjusted) terms.

Table 1 shows that the economic crisis of 1997-98 generated a decrease in countries' total agricultural imports and agricultural imports from the United States, while table 2 shows that countries' imports specifically of meat, dairy, and grain products also declined. For all countries, the import values in both tables fell in 1998 compared with 1997, the only exceptions being Chinese dairy and Indonesian grain imports. Total agricultural imports by the 7 countries dropped in 1998 by a (weighted) average of 15 percent. Agricultural imports from the United States decreased for each country, and by a (weighted) average of 16 percent, with the declines ranging from 41 percent for imports by Malaysia to 8 percent by Hong Kong. For the specific product groups of meat, dairy, and grain, total country imports dropped by more than 10 percent for 16 of the 21 country/product pairings, with the largest falls being in meat imports by Indonesia at 64 percent and Russian grain imports at 59 percent.

Table 1 also shows that for most countries, agricultural imports declined by less than total imports, consistent with the economic argument that because food is a necessity, agricultural and food products are less responsive to income and price changes than most other consumer products—what economists call inelasticity of demand. For 5 of the 7 countries in table 1, the decline in the value of agricultural imports is less than the decline for total imports, China and Russia being the exceptions.

Table 1  
**Change in countries' agricultural imports during East Asian economic crisis of 1997-98**

Country	Agricultural imports in 1997 (billion U.S. dollars)	Agricultural imports from U. S. in 1997 (billion U.S. dollars)	Change in agricultural imports in 1998 (percent)	Change in agricultural imports from U.S. in 1998 (percent)	Change in total imports from world in 1998 (percent)
Japan	38.0	13.0	-9.1	-12.3	-17.1
China	9.0	2.2	-16.8	-16.9	-1.2
Hong Kong	10.5	2.2	-10.0	-7.9	-12.4
South Korea	8.7	3.4	-28.4	-23.5	-35.5
Indonesia	4.5	0.8	-18.2	-39.5	-35.0
Malaysia	4.7	0.6	-19.6	-41.2	-26.2
Russia	12.9	1.1	-21.4	-24.2	-19.1

Source: USDA, Economic Research Service calculations using trade data from IHS Markit (2018) and Food and Agriculture Organization (FAOSTAT).

Table 2

**Change in countries' agricultural imports during East Asian economic crisis of 1997–98 by product group**

Country	Meat	Dairy	Grain
	Percent change in import value		
Japan	-12.3	-5.2	-15.9
China	-3.5	32.5	-21.7
Hong Kong	-1.0	-12.9	-15.3
South Korea	-43.8	-37.8	-14.4
Malaysia	-29.2	-26.2	-21.7
Indonesia	-64.3	-24.5	45.2
Russia	-23.4	-30.7	-58.6

Note: Figures give percent change in value of total imports of the product groups in U.S. dollars in 1998 relative to 1997.

Source: USDA, Economic Research Service calculations using trade data from IHS Markit (2018).

Tables 3 and 4 show the agricultural import response of 6 countries plus the European Union (EU-28, which includes the United Kingdom)<sup>2</sup> and Hong Kong to the world financial and economic crisis of 2008-09. During this crisis, all of the countries/regions in the table experienced either falling GDP or a major drop in the growth rate (China and South Korea), and most also had currency depreciation in relation to the U.S. dollar in real terms, except for Japan, China, and Hong Kong.

Tables 3 and 4 show that the crisis reduced countries' total and aggregate agricultural imports, as well as imports from the United States for the product groups of meat, dairy, and grain. However, compared with tables 1 and 2, there are more exceptions where import values rose rather than fell.<sup>3</sup> In particular, we see an increase in total agricultural imports by Hong Kong as well as its agricultural imports from the United States. Together the countries' total agricultural imports decreased in 2009 by a (weighted) average of 15 percent. Agricultural imports from the United States dropped by a (weighted) average of 17 percent, the declines ranging from 34 percent for South Korea to 3 percent for imports by Canada and China. The (weighted) average of the drop in imports from the United States for meat was 11 percent, for dairy 30 percent, and for grain 42 percent. Table 3 also again confirms that during the crisis, countries' agricultural imports fell less than total imports (15 versus 22 percent on weighted average).

<sup>2</sup>Although the United Kingdom officially left the European Union in January 2020, it was an EU member during the period covered in this report. Throughout the report, we identify the EU as EU-28, which includes the United Kingdom.

<sup>3</sup>The figure that especially catches the eye is the 2,842.5 percent growth in China's grain imports from the United States in table 4. However, this suspiciously large percent increase occurred because the 2008 base value of China's grain imports from the United States was very low.

Table 3

**Change in countries' agricultural imports during 2008-09 world economic crisis**

Country	Agricultural imports in 2008 (billion U.S. dollars)	Agricultural imports from U.S. in 2008 (billion U.S. dollars)	Change in agricultural imports in 2009 (percent)	Change in agricultural imports from U.S. in 2009 (percent)	Change in total imports from world in 2009 (percent)
Canada	25.1	15.2	-3.8	-2.9	-21.3
Mexico	23.1	17.4	-21.0	-21.6	-24.0
China	58.1	13.8	-12.8	-2.9	-11.3
Hong Kong	12.4	1.9	6.1	9.4	-10.4
EU-28	129.2	10.6	-18.4	-30.9	-26.2
Japan	58.1	17.0	-17.4	-23.7	-27.6
South Korea	18.8	6.5	-20.6	-33.5	-25.8
Russia	30.3	2.1	-16.2	-18.2	-39.3

EU-28 = European Union including the United Kingdom.

Note: Figures for EU-28 give external trade, which excludes trade within the European Union.

Source: USDA, Economic Research Service calculations using trade data from IHS Markit (2018).

Table 4

**Change in countries' agricultural imports during 2008-09 world economic crisis by product group**

Country	Meat	Meat from United States	Dairy	Dairy from United States	Grain	Grain from United States
Percent change in import value						
Canada	-3.4	-7.2	-18.0	-15.3	-23.0	-26.1
Mexico	-13.6	-13.4	-28.9	-29.1	-33.1	-34.8
China	-26.7	-27.3	19.9	-32.1	25.5	2,842.5
Hong Kong	7.0	2.0	15.1	-1.2	6.2	-28.7
EU-28	-12.8	-32.9	-12.2	-48.0	-54.1	-75.5
Japan	-11.5	-2.2	-23.6	-34.1	-36.5	-38.3
South Korea	-17.4	6.3	-18.4	-29.2	-33.7	-50.0
Russia	-15.3	-21.3	-21.2	-77.9	-54.8	-62.7

EU-28 = European Union including the United Kingdom.

Note: Figures give percent change in value of imports of product groups in U.S. dollars in 2009 relative to 2008. Figures for EU-28 give external trade, which excludes trade within the European Union.

Source: USDA, Economic Research Service calculations using trade data from IHS Markit (2018).

Countries' imports of grain declined in 2009, generally to a greater degree than imports of meat and dairy. One reason was the substantial drop in world agricultural prices in 2009. During the three preceding years, world agricultural prices rose considerably, especially for grain, such as wheat, corn, and rice. The steep rise contributed to a large fall in 2009, with grain prices decreasing by more than those for livestock products and agricultural and food goods in the aggregate. According to the Food Price Index of the Food and Agriculture Organization, world grain prices declined in 2009 by 27 percent, compared with drops of 12 and 20 percent for the world prices of meat and foods in the aggregate, respectively.

However, the world financial/economic crisis of 2009 contributed to the plunge in agricultural prices. By reducing consumer demand, a drop in GDP and national income will typically reduce both the volume of goods purchased and their prices.

## Projecting the Effects of Possible Future Crises on U.S. Agricultural Exports

We next examine how possible future economic crises in major foreign markets could affect U.S. agricultural exports. For this simulation exercise, we use the ERS Country-Commodity Linked (CCL) System, a model for world agriculture that covers 44 countries and regions, and generates annual volumes of production, use, trade, and prices for 24 agricultural commodities. The model is dynamic and partial equilibrium in nature, consisting of supply and demand equations for products that use synthetic (rather than estimated) own and cross-price elasticities. ERS country and commodity specialists determine the specific elasticity values used in the model, based on their expertise and knowledge of relevant empirical research. Hjort et al. (2018) provide a documentation and review of the modeling system.

The model requires assumptions for key macroeconomic variables, particularly the annual change in countries' GDP and exchange rate. Our exercise involves simulating the effect on U.S. agricultural exports of future economic crises in various major markets for U.S. agricultural exports, by assuming plausible crisis-driven changes in countries' GDP growth and exchange rate. We use USDA's long-term agricultural projections (USDA, 2018) as a starting point, and then consistent with our earlier discussion of the main macroeconomic effects of an economic crisis, we assume a 5-percent decline in the GDP of various economies (lasting only 1 year) and a simultaneous 10-percent depreciation of the countries' real exchange rate, specifically against the U.S. dollar.

The assumption of a crisis-generated 5-percent decline in GDP might seem high by historical standards. However, as identified earlier, during the world financial/economic crisis of 2008-09, GDP fell in a number of major U.S. trading partners by close to 5 percent (5.4 and 4.3 percent in 2009 in Japan and the European Union (28); ERS International Macroeconomic Data Set). The International Monetary Fund (IMF; 2021) estimates that the current global economic crisis caused by COVID-19 reduced world GDP in 2020 by 3.5 percent, and in advanced economies such as Japan, Canada, and the countries that use the euro as their currency by 5-12 percent.

After the 1-year shock, the model returns the country to the GDP level that occurred the year before the shock, with the same growth rate over time as before. However, the country has essentially lost a year of growth, which puts the country 1 year behind the original GDP forecast from trend. Thus, there are permanent effects resulting from the 1-year decline in GDP.

The ERS CCL modeling system used in the simulation exercise measures agricultural goods in volume rather than value terms. However, within the modeling system, goods' prices are a key variable and endogenous. This means that within scenarios, the model generates world trade prices that balance world trade. Given that the value of an amount of a good traded equals the trade volume times the trade price, we use the scenario-generated prices to compute the change in the projected value of countries' agricultural imports and U.S. exports.

We first project the effects on U.S. agricultural exports of economic crisis striking individual countries in isolation, and then examine the impact if all these countries experience crisis simultaneously. The countries included in the analysis are the 8 top foreign markets for U.S. agricultural exports in 2016 and 2017 (FAS GATS): Canada, Mexico, China, the European Union (EU-28, which includes the United Kingdom), Japan, South Korea, Indonesia, and Taiwan. During 2016-17, these 8 countries purchased 69 percent of total U.S. agricultural exports. At some time in the recent past, each of these

countries/regions have experienced at least one economic crisis (by our definition, though again in the case of China, the East Asian Crisis of 1997-98 and world crisis of 2008-09 did not result in a negative GDP growth rate but rather reduced the rate). We also investigate the impacts on the two broad agricultural product groups of grain plus oilseeds and meat (beef, pork, and poultry).<sup>4</sup>

Table 5 shows the results of our simulation for countries' grain/oilseeds and meat imports. The fourth and fifth columns present the results when each country experiences an economic crisis in isolation. The crisis has the expected result of reducing countries' imports of both commodity groups, the exceptions being that grain/oilseed imports by Mexico and Taiwan rise rather than fall.<sup>5</sup>

Mexican imports of grain/oilseeds increase because the currency depreciation raises the domestic prices for livestock products (as it does for all traded goods), which in turn generates more domestic production of livestock products. The dominant grain and oilseed commodity that Mexico imports is corn, used mainly as animal feed. The increase in Mexican livestock output raises the country's demand for feed, including what it imports, by so much that it outweighs the country's decrease in corn import demand from the crisis-associated rise in the corn import price, stemming from currency depreciation. Consequently, Mexico's imports of corn, and thereby grain/oilseed imports, rise during the crisis. This indicates that if imported agricultural commodities are used as intermediate inputs to produce other goods, how the crisis affects the markets for those final products can be the dominant factor in determining the crisis' net effect on imports.

The sixth and seventh columns in table 5 show the results when all countries simultaneously experience an economic crisis. The projected percent decline for each country/product group pairing is greater than when the country in question alone experiences a crisis, the only exception being a slightly lower import drop for Chinese meat in the all-country crisis scenario. The reason for the larger import decrease in the multi-country crisis scenario is that with so many nations concurrently experiencing crisis, the collective decline in world import demand for the commodities reduces world prices by much more than if only one country has a crisis. This, in turn, reduces world prices, which adds to the drop in the import values for countries (that is, import values fall because of a decline in countries' import volumes and prices).

Table 5 shows that in both the single and multi-country crisis scenarios, the import decline is especially strong for China (8.3 and 14.8 percent for grain/oilseeds and meat imports in just the China alone crisis scenario). However, meat imports also decline considerably for Mexico and Indonesia (18.6 and 14.6 percent, respectively, in the multi-country crisis scenario).

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<sup>4</sup>In our examination earlier of the effects of the 1997-98 East Asian and 2008-09 world economic crises on countries' agricultural imports, we covered the product groups of meat, dairy products, and grain. Within the dairy product group, the only goods covered by the ERS CCL modeling system are fluid milk and eggs. Therefore, we exclude dairy products in the projections.

<sup>5</sup>The projected change in a country's import of a specific good because of the crisis is determined by the projected value of the good imported in the crisis year compared to the projected value of the good imported if the crisis did not occur.



Table 5

**Projected change in value of countries' imports of grain/oilseeds and meat from simulated future crises**

Country	Base import value		Single country crisis		Simultaneous multi-country crises	
	Grain and oilseeds	Meat	Grain and oilseeds	Meat	Grain and oilseeds	Meat
	Billion real U.S. dollars		Percent change in import value			
Canada	0.60	0.78	-4.22	-0.40	-8.42	-6.62
Mexico	6.01	3.37	1.63	-13.88	-3.96	-18.57
China	41.83	3.97	-8.30	-14.80	-9.78	-13.59
EU-28	10.97	1.79	-5.13	-2.65	-8.38	-6.48
Japan	5.97	4.30	-1.27	-3.02	-5.49	-8.22
South Korea	2.96	1.68	-1.43	-4.61	-4.57	-9.34
Indonesia	3.41	0.11	-3.85	-9.25	-5.98	-14.65
Taiwan	1.80	0.56	1.49	-8.40	-5.11	-10.29

EU-28 = European Union including the United Kingdom.

Note: Figures give the projected percent change in the value of countries' imports in a year of simulated economic crisis, characterized by a 5-percent fall in their GDP, and a 10-percent real depreciation of their currency against the dollar. The fourth and fifth columns give projections if the crisis hits each country alone, while the sixth and seventh columns give projections if the crisis hits all these countries simultaneously. The base import values are in real (2010) dollars using 2018 import volumes.

Source: USDA, Economic Research Service projections using Country-Commodity Linked System (CCLS).

Next, we examine how a future economic crisis of the type we have identified could affect U.S. agricultural exports. Once again, we simulate a future crisis on the order of magnitude of a 5-percent fall in countries' GDP and a 10-percent real depreciation of their currency.

The ERS CCL modeling system that we use in the simulations is not bilateral, meaning that it cannot isolate the effect of a macroeconomic shock on trade between just two countries. In other words, if South Korea's currency depreciates such that its imports fall, the model cannot determine the effect of that change on U.S. exports to South Korea alone. Rather, the model can only calculate how U.S. total exports to the entire world will change in response to South Korea's currency depreciation. However, in the scenarios where only one country experiences an economic crisis, most of the change in total U.S. agricultural exports generated by the model will come from the change in exports (typically a decline) to that specific country. If U.S. exports of specific products to other countries also change, it will happen mainly because the change/decline in imports by the country experiencing the crisis is so large that it alters the world prices of the traded products, thereby generating secondary trade effects for the United States and world market.

In table 6, the rows with country names give the projections for the change in U.S. exports of grain/oilseeds and meat if each of these individual countries alone experience a crisis, providing results for both the value and volume of exports. As expected, the crises reduce U.S. agricultural exports, the only exceptions being the rise in U.S. grain/oilseed exports to crisis-hit Mexico and Taiwan. U.S. exports to China fall to a greater degree than to other countries, with values declining by 4.2 and 3.3 percent for grain/oilseed and meat exports, respectively.

For all country/product group pairings, the percent drop in export value exceeds the decline in export volume. The reason once again is that the export value for a good equals the volume exported times its trade price, and crises can reduce both the volume of exports that countries want to import from the United States and the prices they pay for the imports. However, in order for the trade price for a good to fall in the single-country crisis scenarios, the pre-crisis volume the country imports must be so large that the crisis-driven decline in the country's import demand reduces the good's world trade price. That the percent decline in the import value is greater than the drop in import volume in every country/commodity group pairing in table 6 indicates that all these countries have some world market power (the power to change world prices by altering trade volume) in these product groups. That, in turn, demonstrates the relatively large size of all these countries in the world markets for grain/oilseeds and meat, and thereby their importance for U.S. agricultural trade.

The bottom row in table 6 shows how much U.S. exports drop when all 8 countries/regions simultaneously experience an economic crisis. The exports now decline by much greater magnitude compared to the single-country crisis scenarios, 6.8 percent for grain and oilseeds and 7.3 percent for meat in value terms, and 1.5 and 1.3 percent for the two product groups in volume terms. This demonstrates the greater degree to which a concurrent multi-country crisis negatively affects U.S. agricultural trade than individual country crises. The large drop in world demand for commodities in the multi-country crisis scenario substantially drives down their world trade prices, and thereby U.S. export values. A multi-country-crisis therefore reduces U.S. exports to a greater extent than single country crisis for two reasons: With more countries in crisis, U.S. total export volumes decrease more, and the collective fall in the countries' demand for agricultural imports lowers world trade prices by a greater percent than if just one country had the crisis.

Table 6

**Projected change in value of U.S. exports of grain/oilseeds and meat from simulated future crises**

Country	Change in U.S. export value (million U.S. dollars)		Percent change in U.S. export value (U.S. dollars)		Percent change in U.S. export volume (tons)	
	Grain and oil seeds	Meat	Grain and oil seeds	Meat	Grain and oil seeds	Meat
Canada	-51	-26	-0.15	-0.25	-0.07	-0.04
Mexico	4	-129	0.01	-1.23	0.18	-0.24
China	-1,460	-349	-4.16	-3.33	-0.36	-0.60
EU-28	-629	-164	-1.79	-1.57	-0.98	-0.24
Japan	-71	-37	-0.20	-0.36	-0.12	-0.12
South Korea	-57	-37	-0.16	-0.35	-0.05	-0.06
Indonesia	-161	-30	-0.46	-0.28	-0.02	-0.03
Taiwan	7	-19	0.02	-0.18	-0.00	-0.04
<b>All 8 countries</b>	<b>-2,380</b>	<b>-767</b>	<b>-6.78</b>	<b>-7.31</b>	<b>-1.51</b>	<b>-1.27</b>

EU-28 = European Union including the United Kingdom.

Note: Figures give the projected percent change in the value and volume of U.S. exports in a year of economic crisis, characterized by a 5-percent fall in countries' GDP and a 10-percent real depreciation of their currency against the dollar when the crisis hits each country alone. The bottom row gives the effect on U.S. exports if a crisis hits all these countries simultaneously. The changes in U.S. export values are in real (2010) dollars using 2018 import volumes.

Source: USDA, Economic Research Service projections using ERS Country-Commodity Linked System (CCLS) model.

To demonstrate this point, in the multi-country crisis scenario, the decline in the world price of pork projected by our model is 7.5 percent. In each of the scenarios where just one country has a crisis, there is only one case where the world corn price falls by more than 2 percent—the China crisis scenario with a world pork price drop of 3.9 percent.

Substantially larger percent declines in exports in value terms compared to volume in the multi-country crisis scenario (6.8 to 1.5 for grain/oilseeds and 7.3 to 1.3 for meat) show that the percent drop in the products' export prices is considerably greater than the percent decline in the export volumes (in absolute terms). This reflects the economic conditions that both the demand and supply (production) of agricultural goods are less responsive/sensitive to changes in price, or exchange rate, and income compared to most other products, as captured by the values for the goods' price and income elasticities of demand and supply within the model. This relative unresponsiveness to price and income changes means that when crisis simultaneously hits a large number of countries and thereby reduces world demand for agricultural and food products—including those imported—prices must adjust by more than quantities to restore market balance, or equilibrium. Consequently, in the multi-country crisis scenario, the value of U.S. exports drops mainly because of a decrease in the prices importers pay, not in the volumes exported.

In table 7, the columns with country names give projections for the change in the value of U.S. exports of specific agricultural commodities when the individual countries experience crisis. For the

vast majority of the country/commodity pairings, the U.S. export values decrease. Note again that the import declines are generally highest for China, especially the drop for soybeans and soybean oil of 5.9 and 7.8 percent, respectively, followed by those for the EU.

The second to last column of the table gives the projected change in U.S. export values when all 8 countries/regions in the simulation experience a crisis simultaneously. The export declines are higher for soybeans and products (meal and oil) and meat (beef, pork, poultry) than for the grains and cotton, with the highest export value drops for soy oil and pork at 13.0 and 8.7 percent, respectively. Again, as in table 6, the decline in U.S. export values is substantially greater in the multi-country scenario than in the single-country crisis cases.

Table 7

**Projected change in value of U.S. exports of specific commodities from simulated future crises**

Commodity	Canada	Mexico	China	EU-28	Japan	South Korea	Indonesia	Taiwan	All 8 countries	Total annual U.S. exports
	Percent change in export value									Billion dollars
Wheat	-0.33	-0.43	-0.71	-2.95	-0.10	-0.15	-0.55	-0.08	<b>-5.16</b>	5.89
Corn	-0.29	1.15	-0.92	-3.59	-0.57	-0.25	-0.43	-0.06	<b>-4.90</b>	9.73
Sorghum	-0.09	-1.68	-1.18	-0.93	-0.23	-0.08	-0.13	-0.04	<b>-4.27</b>	0.46
Rice	-0.06	-0.18	-5.93	-0.28	-0.04	-0.03	0.18	0.08	<b>-6.19</b>	1.75
Soybeans	-0.07	-0.14	-5.88	-1.14	-0.13	-0.15	-0.50	0.06	<b>-7.82</b>	19.06
Soymeal	-0.50	-0.16	-2.46	-2.69	-0.25	-0.50	-1.50	-0.19	<b>-7.87</b>	4.46
Soy oil	-0.41	-1.66	-7.83	-2.34	-0.19	-0.27	-0.16	-0.60	<b>-13.01</b>	0.83
Cotton	-0.02	-0.34	-2.46	-0.20	-0.07	-0.24	-0.20	-0.16	<b>-3.65</b>	6.18
Beef	-0.20	-0.88	-4.18	-0.93	-1.21	-0.09	-0.31	-0.21	<b>-7.80</b>	7.90
Pork	-0.43	-1.08	-4.62	-2.02	0.13	-0.59	-0.14	-0.35	<b>-8.72</b>	6.61
Poultry	-0.16	-1.39	-2.41	-1.47	-0.42	-0.28	-0.36	-0.08	<b>-6.42</b>	4.26

EU-28 = European Union including the United Kingdom.

Note: Figures give the projected percent change in the value of U.S. exports in a year of economic crisis, characterized by a 5-percent fall in countries' GDP and a 10-percent real depreciation of their currency against the dollar when a crisis hits each country alone. The second to last column gives the effect on U.S. exports if the crisis hits all these countries simultaneously. The last column gives the average annual value of total U.S. exports of the commodity to the entire world during 2017-19.

Source: USDA, Economic Research Service (ERS) projections using ERS Country-Commodity Linked (CCLS) model. U.S. export values from the Global Agricultural Trade System (GATS) of the USDA, Foreign Agricultural Service.

Table 8 gives the projected crisis-driven change in the volume of U.S commodity exports. The results again show import declines. The exceptions mainly involve grain and soybeans (and meal), which can be used as animal feed. As discussed earlier for Mexico, the relationship between the livestock sector and animal feed can explain why a country's imports, especially in volume terms, can rise rather than fall during an economic crisis. In the single country crisis scenarios, the export decline for most country/commodity pairings is less than 1 percent. The last column of table 8 gives the projected change in U.S. export volumes when all 8 countries/regions in the simulation simultaneously experience a crisis. That column shows once again that multi-country crises reduce U.S. agricultural exports much more than single country crises.

Table 8

**Projected change in volume of U.S. exports of specific commodities from simulated future crises**

Commodity	Canada	Mexico	China	EU-28	Japan	South Korea	Indonesia	Taiwan	All 8 countries	Total annual U.S. exports
	Percent change in export volume									Million tons
Wheat	-0.13	-0.28	0.13	-1.27	-0.00	-0.03	-0.15	-0.04	<b>-1.75</b>	25.43
Corn	-0.15	0.72	-0.26	-2.05	-0.32	-0.02	-0.19	-0.03	<b>-2.40</b>	54.60
Sorghum	0.01	-0.89	-0.04	-0.03	-0.06	0.02	0.10	-0.01	<b>-0.90</b>	4.17
Rice	-0.02	-0.07	-2.30	-0.11	-0.01	-0.01	0.07	0.03	<b>-2.40</b>	3.54
Soybeans	-0.03	0.06	-0.57	-0.17	-0.02	-0.01	-0.06	-0.02	<b>-0.74</b>	51.25
Soymeal	-0.22	-0.10	0.90	-0.87	-0.06	-0.18	-0.53	-0.14	<b>-1.12</b>	11.89
Soy oil	-0.39	-0.25	-3.80	-1.80	-0.15	-0.25	-0.25	-0.52	<b>-8.15</b>	1.04
Cotton	-0.01	-0.12	-0.86	-0.07	-0.02	-0.08	-0.07	-0.06	<b>-1.27</b>	3.48
Beef	-0.04	-0.19	-0.89	-0.18	-0.26	-0.02	-0.06	-0.04	<b>-1.66</b>	1.31
Pork	-0.07	-0.21	-0.75	-0.27	0.04	-0.10	0.01	-0.06	<b>-1.35</b>	2.52
Poultry	-0.02	-0.28	-0.38	-0.23	0.07	-0.05	-0.05	-0.01	<b>-1.07</b>	3.76

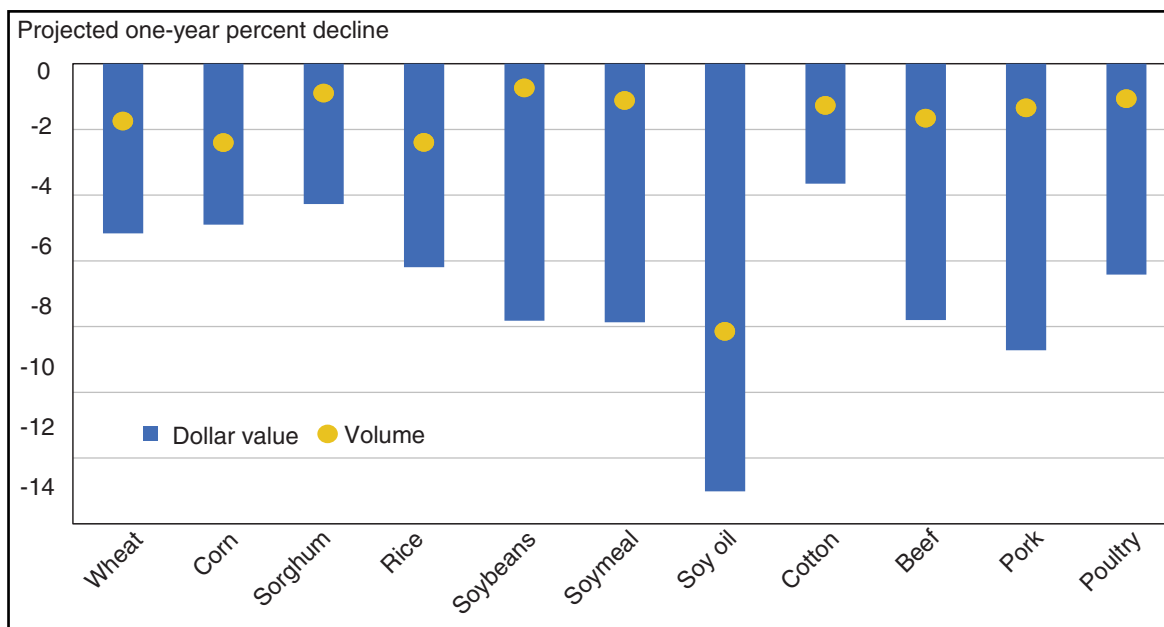
EU-28 = European Union including the United Kingdom.

Note: Figures give the projected percent change in the volume of U.S. exports in a year of economic crisis characterized by a 5-percent fall in countries' GDP and a 10-percent real depreciation of their currency against the dollar when a crisis hits the single country alone. However, the second to last column gives the effect on U.S. exports if a crisis hits all these countries simultaneously. The last column gives the average annual volume of total U.S. exports of the commodity to the entire world during 2017-19.

Source: USDA, Economic Research Service projections using ERS Country-Commodity Linked (CCL) model. U.S. export volumes from the Global Agricultural Trade System (GATS) of the USDA, Foreign Agricultural Service.

Comparing the results in tables 7 and 8 shows that crises generally reduce the value of U.S. exports of individual commodities by a greater magnitude than the volume of exports, and that the disparity is especially strong in the multi-country crisis scenario, as shown by comparing the “All 8 countries” columns in the two tables. Once again, this is because in the multi-country scenario, the crisis-driven percent decline in the trade prices received by U.S. exporters is greater than the percent decline in the volume of U.S. agricultural exports to these countries. Figure 1 demonstrates the point by presenting the decline in both the value and volume of total U.S. exports of the specific commodities in the multi-country crisis scenario.

Figure 1  
**Simultaneous future crises in major foreign markets**



Note: The figure gives the projected percent decline in export values and volumes if a crisis were to hit simultaneously the 8 largest foreign markets for U.S. agricultural exports (in 2016-17; Canada, Mexico, China, the European Union (which includes the United Kingdom), Japan, South Korea, Indonesia, and Taiwan). The crisis is characterized by a 5-percent fall in the importing countries' GDP and a 10 percent real depreciation of their currency against the U.S. dollar, and the export effects are for one year of crisis.

Source: USDA, Economic Research Service projections using ERS Country-Commodity Linked (CCL) model.

## The COVID-19 World Economic Crisis and U.S. Agricultural Exports

Largely because of its global scope, the COVID-19-generated economic crisis of 2020-21 is the most serious world economic calamity of the post-World War II period, surpassing both the 1997-98 East Asian Crisis and 2008-09 world financial/economic crisis. The crisis was still in sway as of early 2021, such that assessing its full effect on U.S. agricultural exports is a topic for future research. A challenge of the analysis would be isolating and measuring the effects of the COVID-19-generated crisis on exports from that of other major world economic developments during the time that also affected U.S. agricultural trade. However, we can use the analysis in this report to make some broad observations about the crisis' impact on U.S. agricultural exports.

The COVID-19 world economic crisis has affected the two key macroeconomic variables this report has focused on in assessing the impact of countries' economic crises on their agricultural imports: GDP and the exchange rate. In 2020, the crisis caused a major decline in the GDP of almost every country, including the main foreign markets for U.S. agricultural exports. According to the IMF (2021), in 2020 world GDP fell by 3.5 percent, though more than double that—7.2 percent—in European countries that use the euro. GDP dropped in Japan by 5.1 percent, in Canada by 5.5 percent, and in Mexico by 8.5 percent. China's 2020 GDP did not decrease, but its previously high growth rate fell to only 2.3 percent. The substantial COVID-19-induced decline in the GDP of U.S. agricultural foreign markets almost certainly had a strong negative effect on U.S. agricultural exports.

At the beginning of the COVID-19 economic crisis, investors throughout the world moved funds to the United States and dollar as a “safe port in the storm” (OECD, 2020). These capital inflows caused the dollar to appreciate and inversely depreciated the currencies of other countries in relation to the dollar. The dollar remained strong throughout 2020 in relation to a number of foreign currencies, mainly those of developing or emerging markets such as Mexico, with the dollar appreciating against the Mexican peso during the year by 7 percent (Pound Sterling LIVE).

However, soon after the crisis' onset, the dollar began to depreciate against the currencies of most of its major foreign markets. In 2020, the dollar fell in value against the euro (7.3 percent), Chinese yuan (7.1 percent), Canadian dollar (5.5 percent), South Korean won (5.2 percent), and Japanese yen (0.1 percent) (Pound Sterling LIVE). An apparent major reason for the dollar's decline was the actions of the U.S. Federal Reserve (the Fed) that substantially reduced the country's interest rates (down to almost zero for many specific rates) to stimulate the economy. A consequence, however, was an outflow of financial investment in search of higher returns elsewhere that depreciated the dollar.

The Fed's monetary actions can be viewed not as an intrinsic economic outcome of the crisis, but rather a discretionary policy decision. That means the dollar's depreciation rather than appreciation during the crisis does not challenge this report's analysis as to how the U.S. dollar exchange rate, and that of foreign currencies against the dollar, might change during a world economic crisis. Nonetheless, the effect of the dollar's depreciation against major foreign currencies during the crisis has been to stimulate rather than reduce U.S. agricultural exports.

The changes in the GDP and currency exchange rates of the top U.S. agricultural foreign markets in 2020 had opposite effects on U.S. agricultural exports: GDP declines lowered U.S. exports,

while currency appreciation of U.S. trade partners in relation to the dollar raised them. In fact, U.S. agricultural exports in 2020 rose by 7 percent to \$146 billion (the second highest total on record; USDA-FAS). That by itself does not mean that the positive effect on exports of dollar depreciation in 2020 (or inversely, other countries' currency appreciation against the dollar) dominated the negative effect on exports of countries' declining GDP. A number of events in 2020 independent of COVID-19 also stimulated U.S. agricultural exports.

Growth in Chinese demand appears to be the main factor that boosted U.S. agricultural exports in 2020. U.S. agricultural exports to China for the year nearly doubled from \$13.9 billion in 2019 to \$26.4 billion. The \$12.5 billion increase in exports to China exceeded the \$8.8 billion growth in total 2020 U.S. agricultural exports (USDA-GATS). China imported record volumes of meat during 2020 as its pork sector suffered from a severe swine disease epidemic. China also imported record volumes of corn and soybeans during the year, and its wheat imports were the largest since the 1990s, all to the benefit of U.S. exporters. In addition, the U.S.-China Phase One trade agreement signed in early 2020 committed China to expand purchases of U.S. commodities (see USDA-ERS, *Outlook for U.S. Agricultural Trade*, February 2021).

Another development unrelated to the COVID-19 crisis that promoted U.S. agricultural exports in 2020 was weather-induced poor harvests in certain competing countries, such as Russia's disappointing grain crop. The Food Price Index of the Food and Agriculture Organization estimated world food prices would rise by 3.2 percent and world grain prices by 6.5 percent in 2020, with that price escalation consistent with both increased Chinese demand and reduced harvests in certain producers. Rising world agricultural and food prices contributed to the growth in the value of U.S. agricultural exports in 2020.

In summary, although the COVID-19-induced drop in countries' GDP worked to lower U.S. agricultural exports in 2020, that negative effect was dominated by the export-enhancing depreciation of the dollar and various world economic developments that stimulated U.S. agricultural foreign sales.

The International Monetary Fund (IMF) and other macroeconomic forecasters predict the world economy will rebound strongly in 2021 from the COVID-19-generated downturn. In January 2021, the IMF (2021) projected world GDP will rise by 5.5 percent in 2021, with GDP increasing in China (8.1 percent), Japan (3.1 percent), the countries that use the euro (4.2 percent), Canada (3.6 percent), and Mexico (4.3 percent)—and with U.S. growth penciled in at 5.1 percent. Growing GDP and corresponding consumer demand in foreign markets will help drive U.S. agricultural exports even higher. In February 2021, USDA (2021) forecast that U.S. agricultural exports would set a record in fiscal year 2021—October 2020 through September 2021— at \$157 billion.



## Conclusions

This report examines the effect of economic crises within countries on their agricultural imports and on U.S. agricultural exports to those affected countries. The focus is on two key features of economic crises: decline in countries' GDP, which is closely aligned to consumer demand, and currency depreciation, both of which reduce countries' agricultural imports and imports in general. The report examines the negative effect on U.S. agricultural exports of past economic crises, specifically the East Asian Crisis of 1997-98 and the world financial/economic crisis of 2008-09, and also uses an ERS model of world agriculture to project how possible future economic crises in the United States' major foreign markets could impact the country's agricultural exports.

Consistent with economic expectations, both the examination of past crises and the projections about the effects of possible future crises show that these events generally reduce countries' agricultural imports, as well as imports specifically from the United States. However, there are some exceptions where countries' imports of specific agricultural products, and U.S. exports of those commodities to the affected countries, rise rather than fall. Almost all the exceptions involve coarse grains (such as corn and sorghum) and soybeans, such as the projected increase from a simulated Mexican crisis in the country's corn imports, both in total and from the United States. Coarse grains and soybeans are used mainly as animal feed, and the main reason these imports can rise is because of the feed-livestock relationship. The increase in countries' domestic agricultural prices from the crisis-driven currency depreciation can stimulate domestic production of livestock goods to such a degree that imports of animal feed grow.

The examination of past crises reveals that countries' agricultural imports generally fell by less than their total imports. This result is consistent with economic theory that because food products are relative necessities, the demand for them is less sensitive and responsive to changes in income and price—including those driven by exchange rate movement—than most other traded goods. The study also finds that U.S. agricultural exports dropped more strongly when multiple foreign countries simultaneously experienced an economic crisis, as opposed to when only a single country did so. The East Asian economic crisis of 1997-98 and the world financial/economic crisis of 2008-09 reduced U.S. agricultural exports to the mix of countries examined in the major crisis years of 1998 and 2009 by 16 and 17 percent, respectively.

The simulation exercise assumes that future concurrent crisis in the 8 largest U.S. foreign agricultural markets in 2016-17 (Canada, Mexico, China, the European Union, Japan, South Korea, Indonesia, and Taiwan) reduces their GDP in 1 year by 5 percent and depreciates their currency by 10 percent. These shocks are projected to decrease in the crisis year the value of U.S. exports of grain and oilseed products (combined) and meat products to the group of countries collectively by 6.8 and 7.3 percent, respectively. The U.S. export volume for the two product groups is projected to drop by 1.5 and 1.3 percent, respectively. The substantially larger decline in the U.S. export value compared to volume indicates that most of the decrease in value comes from a fall in export prices as opposed to quantities, as the major drop in world demand for the export commodities from the multi-country crisis drives down world prices. Multi-country crises can thereby decrease the value of U.S. agricultural exports by much more than a single country crisis not just because the fall in total export volume is greater from more foreign markets being hit, but also because the collective drop in world demand for imported agricultural products can reduce considerably the prices U.S. exporters receive.

Some caveats apply to the results from the simulation exercise. The first is that the model used (the ERS Country-Commodity Linked System) is a set of partial equilibrium models. The results might be different if a detailed, general equilibrium model was employed to incorporate effects on non-agricultural sectors. A second caveat is that in our crisis simulations we have assumed that crisis strikes a country for just 1 year, whereas in reality, it might take a number of years before a country fully recovers from a crisis and returns to its pre-crisis level of GDP. The full effect of economic crises on countries' agricultural imports, and U.S. agricultural exports to them, might be larger than our projections indicate if measured cumulatively over several years.

The economic crisis affecting the world from COVID-19 is different in certain ways from the crises examined in this report; for example, COVID-19 is generating supply-side as well as demand-side shocks, such as disrupting supply chains, both of which lower national output. Yet, the economic fallout from the crisis for most countries includes a large drop in GDP and thereby consumer purchasing power, as well as currency depreciation in relation to the U.S. dollar for some countries. U.S. agricultural exports in 2020 did not fall but in fact rose by 7 percent, because of export-enhancing world developments unrelated to COVID-19. However, based on the discussion in this report, it appears that in the absence of COVID-19, U.S. agricultural exports in 2020 would have been higher.

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