JANUARY 2023

PURDUE AGRICULTURAL ECONOMICS REPORT

your source for in-depth agricultural news straight from the experts

Purdue faculty provide insight on critical issues facing farmers in 2023

Contents:

Welcome from the Editor

Roman Keeney, Associate Professor of Agricultural Economics

Welcome to Purdue Ag Econ's Outlook issue for 2023. The economy remains uncertain following COVID, supply chain disruptions, global conflicts and historic inflation. In some past economic events, like the financial collapse of 2008, agriculture maintained a degree of insulation from the broader economy fluctuations and uncertainty. This has not been the case in the current wave of economic shocks and those factors feature heavily in our authors' contributions for this year's issue.

We start this issue with three articles focused on the broader economy and policy environment. From there, we take a focus on the price and production situation in food and agriculture with contributions on food prices, dairy, and crops. Finally, we close with two articles tuned to farm income, finance, and performance – looking at the credit and farm asset situation.

Inside the issue:

Larry DeBoer considers the possibility of recession in 2023, noting the unusual match between negative growth and declining unemployment. He indicates this and other factors may make any recession be shallow – and may produce enough conflicting indicators to never be tagged as an official recession under

traditional rubrics used to classify such events.

In agricultural trade, Russell Hillberry offers insight on the many factors that have contributed to increased volatility. Foremost among these is the war between Russia and Ukraine and the global market disruptions that have followed from that conflict. He notes that sanctions on Russia (and Belarus) are expected to remain in place beyond 2023 leaving persistent effects from this conflict even if it is halted in the coming year.

The 2018 Farm Bill is set to expire in September of the coming year and makes 2023 critical for farm policy. Following multiple years of emergency support and agriculture benefitting from COVID relief packages, government direct support to agriculture is set to fall dramatically. Roman Keeney discusses the implications of these changes and notes that the short timeline and a wave of new congressional representatives make replacing the 2018 Farm Bill in 2023 a significant challenge.

In food prices, Jayson Lusk sorts through some key determinants of price increases – including those that may have resulted in food price inflation outpacing that of the general price levels in the economy. He indicates that food prices became one of the largest consumer spending concerns over the course of 2022, eventually triggering a number of responses in spending and substitutions by households. The outlook for 2023 is murky but leading indicators on consumer expectations point to a return to more normal changes in the average food price level for the year ahead.

Nicole Widmar uses this outlook occasion to update the dairy situation and to review 2022's formula shortages – paying particular attention to the initial causes and the lack of timeliness in response. She draws from recent analysis to highlight the first significant notices of a potential supply shortage and the severe lag in awareness and response by consumers, industry and policy-makers. The delay in scoping the problem almost certainly exacerbated the panicked response in markets and households to continued news of shortage.

Looking ahead to the 2023 crop year, Michael Langemeier provides updates from the Center for Commercial Agriculture's *Crop Cost and Returns Guide* pegged to December estimates. The most recent data indicates that input costs should be similar to the quite high levels of 2022 – which for fertilizer and land rents were above recent peak levels seen in 2013 and 2014. These continued high costs will keep profit margins tight in spite of high commodity prices – with e.g. the expected gross revenue from an acre of corn unable to fully cover land rents and other market rate returns to resources allocated to production.

Brady Brewer and Todd Kuethe review the past year in finance, when the Federal Reserved ratcheted interest rates upward on seven consecutive occasions of the Fed's Open Market Committee meeting. This has resulted in a sharp turn against long running trends of average interest rates for agricultural loans. Increasing rates dampened demand for operating loans while increased fertilizer prices spurs more borrowing – these competing factors continue to set the pace of borrowing. The authors close with discussion of the supply side of funds, flagging that as an item to watch in the coming year.

We close our issue with Todd Kuethe's look ahead to land markets for the coming year. Each summer the Purdue Ag Econ Report devotes an issue to land values – including reporting on the most recently collected data from Indiana surveys on land markets. For this interim report, he reviews other survey reports and indicators that might provide signals for the coming year and to put data from Indiana's summer survey in context with regional findings and trends. Taking into account a number of factors, Kuethe expects land rents to increase but at lower levels than the record increase seen in 2022.

Closing thoughts

Each year Purdue Ag Econ faculty take stock of a number of key issues in the agricultural economy and look to provide perspective for the coming year in this Outlook issue. Hopefully, this collection provides a good starting point for decision-makers who will need to monitor developments throughout the year.

While this issue provides a snapshot of outreach expertise in Purdue Ag Econ, I want to close this editorial by pointing readers to the many ongoing contributions of centers in the department that provide regular and timely information for the state we serve. Whether it is the Center for Commercial Agriculture's periodic market outlook reports, the Center for Food Demand Analysis and Sustainability's monthly consumer reports, the Purdue Center for Regional Development's recently developed job earnings index or any of the many other center and individual outreach efforts of faculty, staff, and students – the experts in Purdue's College of Agriculture and the Agricultural Economics department are making daily efforts to provide value to our Indiana stakeholders.

All the best in the New Year!

Roman Keeney
Associate Professor
Purdue Agricultural Economics Report Co-Editor

PURDUE
AGRICULTURAL ECONOMICS REPORT

Title	The Outlook for the U.S. Economy in 2023: The Faster Inflation Falls, the Milder the Recession Will Be
Author	Larry DeBoer
Article ID	PAER-2023-01
Date	January 5, 2023
Tags	Recession, Inflation, Unemployment, Inverted Yield Curve
Summary	Professor DeBoer surmises that a recession is likely in 2023, but it may have enough confounding factors (e.g. low unemployment) to make it quite mild.

Will there be a recession in 2023? Wall Street thinks so. The yield curve has inverted, which is a reliable indicator of recession in the near future.

Interest rates on long-term bonds are almost always higher than on short term bonds. Lenders expect a premium for tying up their money for a long time. This reverses when a recession is expected, as lenders try to lock in higher yields by lending long term. The difference between the yields on the 10-year and 2-year Treasury bonds inverted before each of the past six recessions (even for a few days in August 2019—did Wall Street really anticipate the 2020 pandemic?). It inverted in early July 2022 and *is more negative now than it's been in 40 years*. The probability of a recession is high.

Calling a recession is tricky, though. Real GDP fell for two consecutive quarters in the first half of 2022, yet it was not a recession. Employment continued to grow, and the unemployment rate fell to 3.5%, *tied for the lowest reading in 50 years*. It's not a recession without rising unemployment.

Consumers increased their spending by 2.1% above inflation over the past year. Consumers are pessimistic. According to the University of Michigan's survey of consumer sentiment, consumers are more pessimistic now than during the worst of the COVID recession. Pessimistic consumers usually cut their spending.

The pessimism shows in the spending data. Consumer spending grew rapidly in 2021 but has tailed off in the second half of 2022. Still, manufacturers' orders for consumer goods have been rising over the past year. Goods orders are a leading indicator of consumption spending. Businesses think consumers will buy.

Higher interest rates, continued inflation and uncertainly about employment may restrain consumer spending growth further. But consumers still have a lot of savings left over from federal COVID aid, so maybe businesses are right. Expect consumer spending growth to be a little slower in 2023 than in 2022.

Business investment fell in the second and third quarters, and is barely higher now that it was a year ago. Construction of business buildings is 9% lower now than a year ago. The pandemic

trend to work-at-home has reduced the need for office space, which must be contributing to the drop in construction. Conversely, business equipment and software purchases are up 5% and 8% respectively. With employees hard to come by, businesses turn to automation, which requires new equipment and the software to run it.

With interest rates higher and work-at-home continuing, structures investment is unlikely to turn upward. The labor shortage will lessen with the turn toward recession, so equipment and software investment growth should slow.

Home construction is the industry first affected by rising interest rates. The mortgage rate rose from 3.1% last December to 6.4% now. As a result, housing starts dropped by 21% from April to November. Building permits are down too, indicating less construction in the near future.

Interest rates will continue to rise at least through mid-year. Slowing sales will cause businesses to pause their expansion plans. Investment spending is likely to fall in 2023.

The federal government's budget is much less expansionary now than it was a year ago, simply because there was no big COVID aid package in 2022. The budget deficit fell from 18% of GDP in the first quarter of 2021, to 4% of GDP in the third quarter of 2022. The deficit will likely grow somewhat in 2023 with slowing income tax receipts, rising Social Security and other transfer payments, and possibly added defense spending. But it will still add much less to spending than was true in 2021.

State and local governments are still flush from the post-COVID revenue boom. Indiana, for example, expects to have almost $5 billion in the bank at the end of fiscal 2023 this coming June, which is double the highest pre-COVID amount. Slower growth in incomes and sales, and falling inflation, will slow revenue growth, but spending should continue to grow.

Exports are likely to fall, and imports rise. Rising U.S. interest rates are raising the exchange value of the dollar, which makes U.S. exports more expensive and imports cheaper. Europe and Britain may already be in recession, which will also reduce U.S. exports. The trade deficit likely will grow in 2023, which will be a drag on GDP growth.

Consumer spending grows more slowly, investment spending falls, government spending holds steady and the trade deficit expands. This adds up to near-zero growth for real GDP in 2023, with a couple of quarters of decline, and a couple with modest growth.

To be called a recession, though, unemployment must rise. Labor force participation has not fully recovered from the pandemic, and labor is scarce. As of October there were 10.3 million job openings and only 6 million people looking for work, a labor shortage of 4.3 million people.

Job openings have been dropping, by 7% over the past year. The number of job searchers—that is, unemployed people—bottomed out in April and has edged upward since. Initial claims for unemployment insurance have increased. Yet the unemployment rate has barely budged. It was 3.7% in November, up from 3.5% in July and September. This makes sense. People who lose their jobs soon find another, even if they collect unemployment insurance while they're looking.

The slowing economy will reduce the 4.3 million employee shortfall. The number of job openings will fall as businesses cut their expansion plans. Job searches will take longer, and some unemployed people will not have the skills needed for the open jobs. Construction workers may be unemployed; job openings may be for nurses. If GDP doesn't grow the gap between job

openings and job searchers will close. With the number of openings nearly equal to the number of unemployed people, the unemployment rate will rise to 4.5 percent by the end of 2023.

A rise that big activates the "Sahm Rule." Economist Claudia Sahm found that when the unemployment rate rises by 0.5 percentage points compared to its low the previous year, a recession has begun and the unemployment rate will continue to rise. This is because of the "negative feedback loop" or "vicious cycle." People lose their jobs and spend less. Businesses see their sales fall, cut back on production, and lay off employees. Those people cut their spending, businesses cut more employees, and the recession is on.

Two factors may interrupt the negative loop this time. It will take time to eliminate the labor shortage, so newly unemployed people may find new jobs quickly. They won't have to reduce their spending. And, a study by the Federal Reserve found that households still have more than a trillion dollars in extra savings left over from federal COVID aid. If newly unemployed people can't find new jobs, their savings may sustain their spending. This time, the unemployment rate may rise eight-tenths of a point to 4.5%—but not much further.

The inflation rate is going to fall. The question is how much and how fast. The all-items consumer price index rose 7.1% from November 2021 to this November. This is down modestly from the 12-month rate in June, which was 9%. Still, this is the highest inflation in 40 years.

Prices of durable goods like cars and electronics rose rapidly at the onset of inflation, peaking at 18% in January 2022. People shifted a trillion dollars in spending from services to goods, to avoid the face-to-face contract and crowds required to buy many services. Goods producers couldn't meet the demand, especially with the famous pandemic supply chain problems. Prices spiked upward. Since then durable goods inflation has dropped, to 2.4% in November. While consumers have kept buying goods, supply chain problems have partly cleared. The New York Federal Reserve's Global Supply Chain Pressure Index peaked in December 2021 and has declined in most months since, indicating an easing in transportation costs and manufacturing shortages.

Non-durable goods inflation is dominated by oil prices. The COVID lockdown reduced demand for motor fuel and gasoline prices dropped below $2 in April 2020. The rapid recovery took oil producers by surprise, pushing the U.S. average price to $3.52 in February. Then the war in Ukraine disrupted supplies. The average gasoline price peaked in June, at $4.93. It's come down since then, averaging $3.69 in November.

Inflation in services has not fallen yet. The 12-month inflation rate was 7.2% in November, near the highest rate in 40 years. The services price index is closely related to housing rents and service employee wages. Rents have been rising with increased demand for space from the work-at-home trend. The labor shortage has pushed up wages. Rent inflation may come down as some people return to in-person work and leases expire. Wage growth may slow with rising unemployment. There's no sign of these trends yet though.

Higher interest rates and slower growth will reduce the demand for goods and services. The stronger exchange value of the dollar should reduce the prices of imported goods. Supply chain problems should continue to clear. If oil prices don't spike again, by next June the 12-month gasoline inflation rate will show a 25% decline from the 2021 price peak. Expiring leases and rising unemployment should begin to cut service price inflation. Look for the inflation rate to be 3.5% by this time next year. Most of the drop should occur in the first half of 2023.

The Federal Reserve will increase interest rates in 2023. Again, the question is how much and how fast. At the start of 2022 the Fed's policy interest rate, the federal funds rate, was near zero. Inflation was unexpectedly high, so in March the Fed began raising rates. Inflation continued to increase and the Fed got serious, with four enormous three-quarter point increases starting in June. With December's half-point increase, the federal funds rate stands at 4.3%. This is among the most rapid rate increases in the Fed's history. The Fed is slamming on the brakes.

The Federal Reserve's economists themselves predict that the Federal Funds rate will be 5.1% in 2023. This means only three more one-quarter point increases. These are likely to take place in the first half of the year. If inflation falls as expected, and recession threatens, the Fed might even reduce rates a little towards the end of 2023. If inflation refuses to fall the federal funds rate will rise more.

Short term Treasury interest rates usually move in lock-step with the federal funds rate, so expect the 3 month Treasury bill yield to be 5.1% in the second half of 2023. The 10-year Treasury bond yield is 3.7% in mid-December. Long-term Treasury rates tend to rise by less than the federal funds rate, so the 10-year Treasury bond yield should be 4.2% in the second half of 2023. The yield curve inversion will continue for a while.

A recession is likely. If the unemployment rate remains below 5%, it would be the mildest recession in the post-WWII era. So mild that it might not even be marked as an "official" recession. Durable and non-durable goods inflation will fall—assuming no new spike in oil prices—so a drop in all-items inflation is nearly certain. But reaching the Fed's 2% target rate requires service price inflation to fall, and that is less certain. If it doesn't fall, the Fed might decide to raise interest rates more than expected, and then an official recession is much more likely.

PURDUE
AGRICULTURAL ECONOMICS REPORT

Title	*Trade and Trade Policy Outlook*
Author	Russell Hillberry
Article ID	*PAER-2023-02*
Date	January 5, 2023

Last year's trade and trade policy outlook discussed the supply chain problems that had emerged in the prior year (Hillberry, 2022). A key metric for agricultural supply chain disruption in 2021 was bulk freight rates, which are most often summarized by the Baltic Dry Goods Index. By December of 2021, the index had fallen by more than half from their October 2021 peak. Freight rate volatility continued in 2022, though the index moved downward over time. Bulk shipping rates were cut by more than half during 2022. See Figure 1.

Figure 1. Baltic Dry Goods index, 2022

Source: MarineVesselTraffic.com (series updated daily at the link)

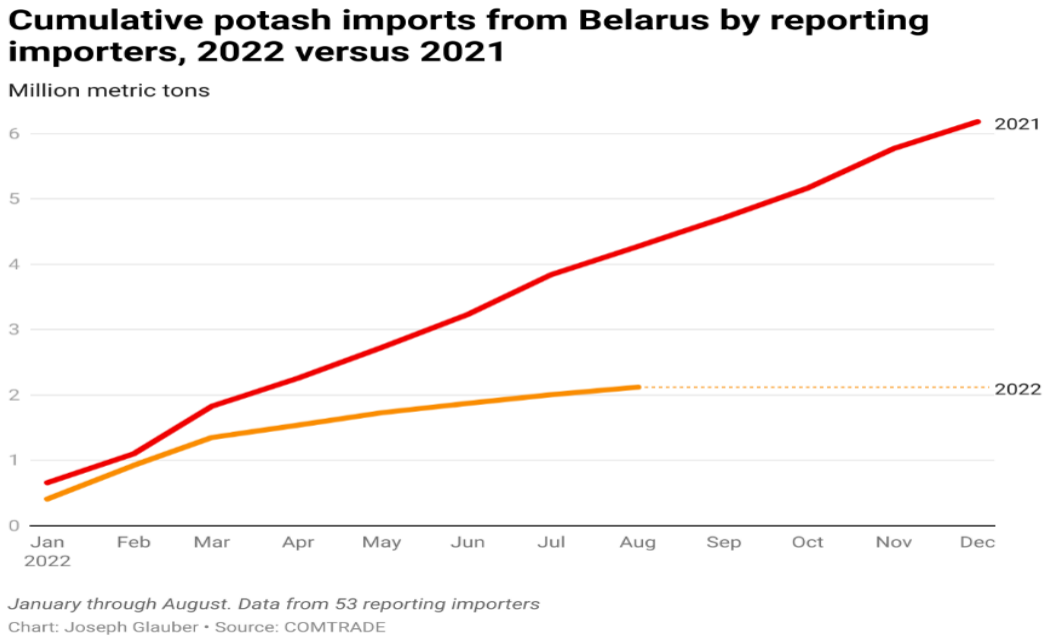
Russia - Ukraine war

The event that most affected international agricultural markets in 2022 was not foreseeable at this time last year. Russia's late February invasion of Ukraine substantially disrupted global markets for both inputs and outputs of commercial agriculture. Ukraine's own agricultural exports were disrupted by the war. Ukraine is a large producer of sunflowers and other oilseeds (including soybeans), corn, barley and wheat. It plays an outsized role in global *exports* of these commodities, as many countries that are larger in terms of production consume a higher share of their own output. Wheat was the commodity with the largest impact of the invasion on its price (Legrand, 2022).

Russian exports – both of agricultural products and of fertilizer - have not been targeted by an otherwise crippling sanctions program. It nonetheless seems that other parts of the sanctions program have had an impact on Russia's production and export of these commodities (Glauber and Laborde, 2022). Russia's wheat exports have recovered after an initial shock. Exports of anhydrous ammonia, potash and urea are down substantially from this time last year. Russia has also imposed taxes and other restrictions on its exports, which has contributed to the reduced supply of its commodities on global markets.

Belarus - an ally of Russia that allowed its territory to be used as a launching pad for the invasion – depends heavily on exports of potash, so potash has been included in the sanctions package on Belarus. Although most agricultural commodities and fertilizers are exempt from the sanctions imposed on Russia, these sanctions also include potash, an attempt by western countries to avoid the possibility that Belarusian exports would move through Russian ports. Using other countries' import data to track Belarusian exports, Glauber and Laborde (2022) calculate that year-to-date exports of Potash from Belarus in 2022 were half the value of the counterpart figure for 2021. See Figure 2.

Figure 2. Imputed Belarusian exports of Potash, Year-to-date 2021 vs. 2022



Source: Glauber and Laborde (2022)

The war also caused substantial disruptions to global energy markets, though these effects have moderated substantially since the first weeks of the war. It is likely that the largest disruptions were to Europe's regional market for natural gas. While the disruptions to the natural gas market have been largely offset by various market and policy changes, one of these changes has been to limit EU fertilizer production, which usually relies on imported natural gas to produce ammonia (Giles, 2022).

The war also disrupted global oil markets, which saw enormous price spikes in early 2022. Prices of petroleum-based energy rose as well, but have fallen more recently. Retail prices for diesel fuel peaked in June and have slowly drifted lower, while remaining elevated relative to lows observed in 2020 and 2016. See Figure 3.

Figure 3. Retail Price of Diesel Fuel (on Highway), in Dollars per Gallon.

Source: Federal Reserve Bank of St Louis FRED database, using Energy Information Administration data

Outlook

It is difficult to project either the duration or outcome of the war. Whatever developments occur, it seems likely that sanctions on Russia and Belarus will endure for several years to come. While grain and oilseed markets might be expected to stabilize eventually, it would seem unlikely that this will occur in the upcoming year. Fertilizer markets (especially Potash) may be disrupted until sanctions on Russia and Belarus are lifted, an event that is unlikely in the next several years. The effects of initial shocks to oil markets appear to be receding, though costs of diesel fuel remain at elevated levels.

Global currency markets

The increase in prices of fuels, agricultural commodities and fertilizers after the outbreak of the war magnified already existing inflationary pressures in the U.S. and global economies. Following an inflationary spike early in 2022, many central banks raised interest rates. These moves are relevant for international trade because they affect the relative value of different countries' currencies. Partially due to higher interest rates, and partially due to its role as a safe haven currency in a crisis, the U.S. dollar rose against most currencies. Figure 4 shows a U.S. nominal dollar index reported by the St Louis Federal Reserve Bank. The U.S. dollar rose by roughly 10 percent from January to October, though half of that gain had been erased by December.

Figure 4. U.S. dollar Index, 2022

Source: Federal Reserve Bank of St Louis FRED database, 2022

Fluctuations in currency markets affect international trade outcomes because they affect the short-run US dollar prices of inputs and commodities sourced from, and sold to, foreign markets. A stronger U.S. dollar makes goods produced by other countries appear relatively cheaper in U.S. dollar terms, while products produced in the U.S. become more expensive in foreign currency terms. Holding fixed other forces that affect prices, a rising dollar allows inputs to be purchased more cheaply. A strong dollar also makes U.S. exports less competitive in foreign markets.

Outlook

Forecasting developments in currency exchange markets is extremely difficult. That said, a guess about developments in 2023 is useful for setting expectations. There are signs that U.S. inflation is subsiding, which may lead the U.S. Federal Reserve to ease monetary policy, at least relative to monetary policy made by other countries' central banks. If this occurs, one would expect the U.S. dollar to fall back, as it has begun to do already. Such moves would make imported inputs (such as fuels and fertilizers) more expensive in US dollar terms, even as it enhanced the competitiveness of U.S. produced commodities on foreign markets. It does seem likely that the 2023 will see continued volatility in US dollar exchange rates, as central banks are unlikely to be coordinate their actions in a way that limits fluctuations in currency markets.

U.S. Trade policy developments

In recent years, U.S. trade policy developments have been a centerpiece of this review. Unlike most recent presidential administrations, the Biden administration has deemphasized trade policy as an area of priority. In one form or another, Presidents Reagan, Bush Sr., Clinton, Bush Jr. and Obama pursued trade liberalization by negotiating preferential trade agreements with willing partner countries. President Trump took a different path, but protectionist trade policy was nonetheless a highly visible part of his foreign policy. While trade policy has taken a back seat to other matters in the Biden Administration, there are still trade relevant developments worth discussing.

The Biden Administration's Russian sanctions policy is first and foremost an international security policy, but nonetheless has obvious links to trade policy. In the early stages of the policy, financial restrictions were the most consequential. But restrictions on sales of most manufactured products to the Russia – both by the US and by its allies – appear to be damaging Russia's ability to produce advanced weaponry (Sytas, 2022). An ongoing project at Yale University is tracking the deleterious effects of sanctions on the broader Russian economy (Sonnenfeld, 2022). Russia has stopped publishing most of its economic statistics, and this project is tracking other information that informs our understanding of how sanctions are affecting the Russian economy. It seems that the sanctions are producing significant economic damage there.

In a related set of policy moves, the Biden Administration has begun to impose export controls on high technology goods (especially advanced semi-conductors) that are destined for China (Tewari and Josephs, 2022). These actions seem to be motivated both by longer run national security concerns and by an attempt to use industrial policy to re-shore production of high-tech goods in the United States. The Chinese have appealed to the World Trade Organization, which the Biden administration argues is an inappropriate forum for adjudicating the dispute. It seems plausible that this policy poses a short-term risk for export-oriented agriculture, since the Chinese may choose to retaliate with tariffs on U.S. agricultural products. The deterioration of the WTO as a forum for mediating trade distributes also poses a longer run challenge for export-oriented US agriculture.

The restrictions on China, together with large subsidies for electric vehicle production in the U.S. is also affecting US relationships with its traditional allies, especially those in Europe. Export controls on advanced semiconductors are also being imposed on foreign firms (firms based in the Netherlands and Japan, for example), using those firms' desire to access to the U.S. market as leverage. The large subsidies on electric vehicle production were part of the Inflation Reduction Act of 2022. The goal of the subsidies was to encourage US production of electric vehicles, relative to China. But the policy has also ruffled feathers in Japan, Korea and Europe, with potential implications for further foreign policy cooperation and for the strength of multilateral institutions such as the WTO (Feingold, 2022)

Outlook

Both the export controls and the electric vehicle subsidies implemented by the Biden Administration are forms of industrial policy that aim to support development of particular sectors. Economists are usually skeptical of such efforts, while acknowledging that there can be a role for trade policy in pursuing national security goals. In terms of the prospects for U.S. agricultural exports, past trade policy outlooks have lamented the ongoing weakening of multilateral trade institutions, especially the WTO. The

weakening of the WTO poses a long-run problem for export-oriented agriculture. The rise of China, makes policy making difficult, no doubt; but the apathy of the Biden Administration towards multilateral institutions, in the wake of outright hostility by the Trump Administration, is reason for real concern about the future of both multilateral trade negotiations and rules-based adjudication of international trade disputes.

References

Feingold, Spencer (2022) "What the world thinks about the new US electric vehicle tax plan," World Economic Forum Blog Post, November 16.

Giles, Chris (2022) "The end of Europe's energy crisis is in sight," Financial Times, October 27, https://www.ft.com/content/8c4f9b6f-7770-490e-83e8-3fdd12f7a99f

Glauber, Joseph and David Laborde (2022) "How sanctions on Russia and Belarus are impacting exports of agricultural products and fertilizer" International Food Policy Research Institute Blog post, Nov 9, 2022.

Hillberry, Russell (2022) "Trade and trade policy outlook, 2022", *Purdue Ag Econ Report: Agricultural Outlook for 2022* https://ag.purdue.edu/commercialag/home/paer-article/trade-and-trade-policy-outlook-2022/

Legrand, Nicolas (forthcoming) "War in Ukraine: The Rational "Wait-and-See" Mode of Global Food Markets," *Applied Economic and Policy Perspectives*

Sonnenfeld, Jeffrey (2022) "Business Retreats and Sanctions Are Crippling the Russian Economy," Russian Economic impact Slide Deck, August 2022 v6.pdf, Yale University.

Sytas, Andrius (2022) "Sanctions hamper Russia's ability to make advanced weapons, NATO says," Reuters, September 16.

Tewari, Suranjana and Jonathan Josephs (2022) "US-China chip war: How the technology dispute is playing out," BBC News, December 16.

PURDUE AGRICULTURAL ECONOMICS REPORT

Title	What factors will shape a 2023 Farm Bill
Author	Roman Keeney
Article ID	PAER-2023-03
Date	January 5, 2023
Tags	Farm Bill, Commodity Title, Commodity Prices, Emergency Payments

At the end of September 2023, the most recent omnibus "Farm Bill" (passed in 2018) will expire. This deadline for reauthorization is one of a number of factors that promise an interesting 2023 for farm policy watchers. The short timeline for replacing (or extending) the 2018 farm bill is set against a backdrop of politically divided government and the lingering effects of economic shocks that have triggered tens of billions in *ad hoc* and emergency transfers to agricultural households.

Farm support in the current economy

The period covered by the 2018 farm bill (crop years 2019 – 2023) have yielded some of the largest direct government transfers to agriculture this century. Trade adjustment payments for crop producers followed by multiple COVID relief spending bills have made clear that factors outside of the agricultural economy and policies that directly target agriculture are largely determining how government impacts US farm fortunes.

Figure 1a. Farm direct payments (in millions of US dollars) from 2015 to 2022

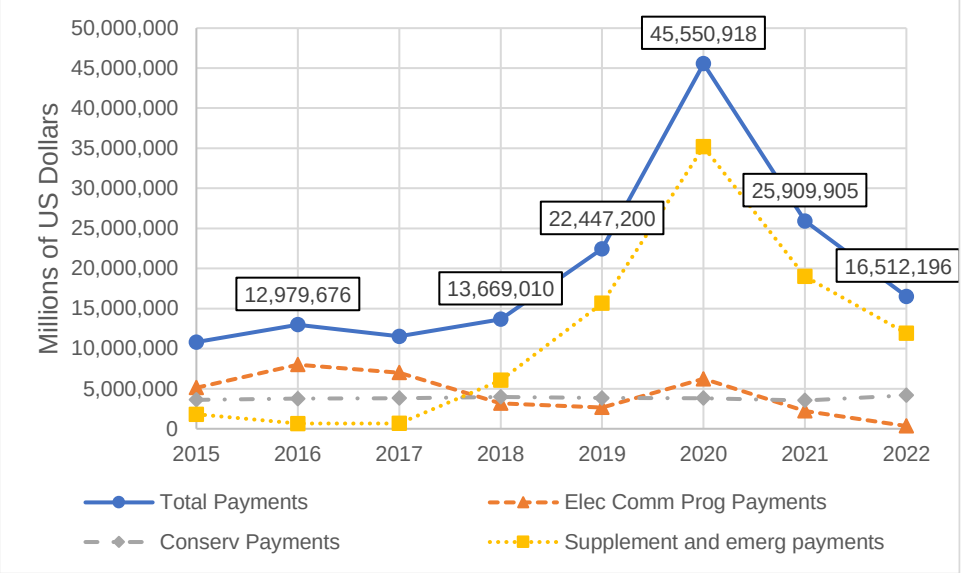
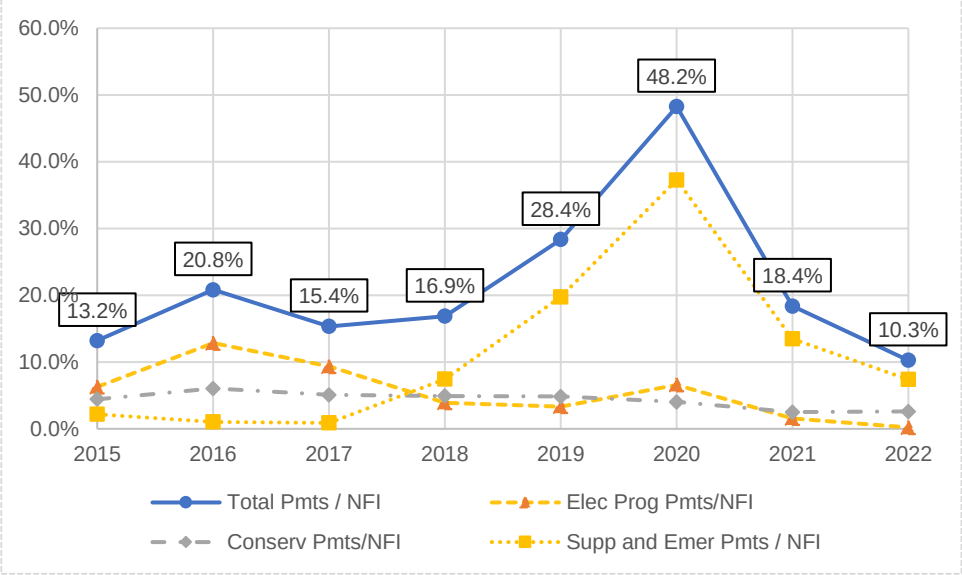


Figure 1a shows that peak payments to producers occurred during 2020, when government direct support to agriculture totaled more than $45 billion while accounting for nearly one half of national net farm income (see figure 1b). These graphs (figure 1a & 1b) make clear the role of *ad hoc* and emergency programs, temporary government relief efforts, in supplementing farm incomes. As we near the close of the current farm bill's authority, we see that total payments to farms have declined and are near the levels

from before the Trade War. Importantly, high expected prices (relative to the previous five years) are well above payment triggers for most commodities causing expected 2022 and 2023 program payments under either of the elective commodity programs[1] to be very low (under $1 billion in aggregate for 2022).

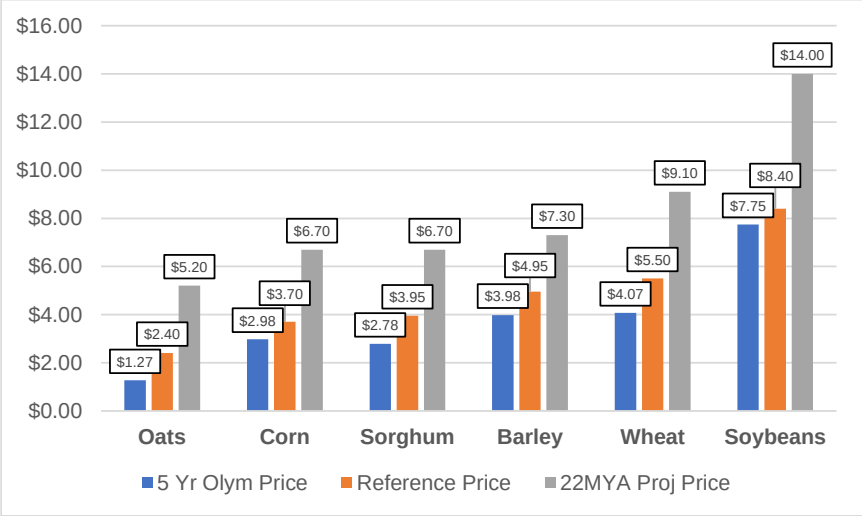
The disappearance of commodity program payments is illustrated in figure 2, where we compare marketing year average prices to the five-year Olympic average and reference prices that set levels for triggering payments. Increasing prices over time make it less likely that producers will qualify for payments by design. The large difference between 2022 marketing year average (MYA) and reference prices codified into the farm bill's commodity title indicates that prices (and the current cost of production) are well above the expected output and input pricing at the time the 2018 farm bill was passed. The costs and returns in agriculture of the current inflationary environment highlight a limitation of using output prices in isolation for program triggers in basic farm safety net programs – namely that payments can disappear while real returns are declining.

Figure 1b. Farm direct payments (as percent of net farm income) from 2015 to 2022



Source: Author's calculations using current USDA farm support and income data.

Figure 2. Price loss coverage reference price levels vs MYA, 2022



Source: USDA Price loss coverage program data sheet for 2022 crop year

[1] Price loss coverage (PLC) and Agricultural Risk Coverage (ARC) are the two programs farmers must make an 'election' for their participation. These have been the primary commodity payment programs providing direct support to producers since the elimination of the direct payment programs that were replaced in the 2014 farm bill.

Dimensions of the farm bill debate

Policy-makers have signaled some priorities for new farm bill legislation in the past year of legislative action and hearings. Already, incoming Republican leadership for the US House of Representatives has indicated a desire to deemphasize climate policy within the farm bill relative to e.g. its significance in 2022's inflation reduction bill passed by Democrat controlled government. Political debate is unlikely to focus on specifics of the commodity title which now has a diminished role in favor of crop insurance in protecting farm incomes. However, producers may expect to see some incentivized production practices (either in the commodity title or elsewhere) for voluntary practices viewed as regenerative or environmentally friendly in a manner that furthers climate goals if they can be made consistent with other priorities of the legislation.

The overall budget, and particularly spending on the nutrition title (primarily food assistance for low-income households) should continue to be the most politically divisive component of the farm bill debate. In table 1, the final column indicates that the most recent congressional budget office (CBO) baseline[2] for farm bill spending totals nearly $1.3 trillion over ten years with approximately 84% of that money spent through the nutrition title. The first column of table 1 indicates that at the time of passage it was estimated that nutrition programs were expected to command only about three-fourths of the farm bill budget.

Table 1. Budget estimates for 2018 Farm Bill programs, ten years

	2018 Passage	2021 CBO	2022 CBO
	Billions		
Total Spending	$867	$1,033	$1,295
	Percentage of total spending		
Nutrition	76.1%	78.9%	84.2%
Crop Insurance	8.9%	9.2%	6.2%
Commodity Programs	7.3%	5.3%	4.3%
Conservation	6.8%	5.7%	4.6%

Source: Author's calculations from CRS's 2022 Farm Bill Primer sheet

The performance of the economy and the increasing economic stress on households at the low-income margin in the past two years has dramatically changed the shape of the farm bill spending pie. We can see just how recent this shift in the economy occurred by comparing the 2nd and 3rd columns of table 1 which indicate that most of the adjustment in expected total and nutrition spending occurred in the twelve months between spring 2021 and 2022.

The remaining entries in table 1 indicate a declining role for other major spending categories (commodity programs, conservation, and crop insurance). The relative strength of the agricultural economy (net cash farm incomes are trending up relative to twenty year averages) would cause farm bill spending to shift away from agriculture programs through normal economic mechanisms (high commodity prices, land rents that disincentivize conservation enrollment) even if there weren't such rapid increase in nutrition spending.

Looking back on the past five years of pertinent policy debate, the role of eligibility and limits on total support have surfaced with political champions for reform in farm commodity and nutrition spending.

[2] New 2023 farm legislation will not be written using the 2022 CBO baseline – this is just the most recent baseline available at the time of this writing. A new CBO baseline for the farm bill will be produced in spring 2023 and will set the budget limits on the overall bill as well as the expected allocation between titles and programs that would occur if the 2018 law were to continue unchanged 10 years into the future.

The pressure to enact new law that spends less than the estimated budget heightens the role of payment limits and eligibility requirements in the debate. The setting of income thresholds and establishment of required practices[3] by payment beneficiaries are both qualifiers that could be adjusted to more narrowly define target recipients in the name of farm bill reform (and deficit reduction).

Concluding remarks

As 2023 unfolds the first signpost on the road to a new farm bill will be the release of an updated baseline for the Congressional Budget Office. Once that is available, the total estimated mandatory spending over a ten-year horizon of current law will set the limit for any changes and allow debate to begin on what the target spending level should be (i.e., whether and how much the farm bill should contribute to deficit reduction). Competing bills from House and Senate Ag committees will be scored relative to that baseline and we will see side-by-sides comparing the bills in terms of their primary agenda items and priorities. From there, it's a race against the end of fiscal 2023 clock to complete the work to find a compromise that merits passage and sets the ground rules for farm support and food assistance.

The politics of farm bill passage are not always obvious from basic partisanship. The marrying of commodity and nutrition programs have long supported a rural-urban coalition that has allowed all sides to claim farm bill passage as a "win". The timing of the current bill – during a 2023 that could see several presidential campaigns launch and new Republican leadership in the House looking to advance its agenda as a governing alternative – is not ideal for the pace of passage that would meet the October 1 expiry of the current farm bill. Any emerging political complications during 2023 will only be amplified next year such that as we get closer to October 1 in 2023 the more likely we are to get a direct extension of current programs. While this would alleviate uncertainty about mechanisms for support it would do very little to deal with total spending growth in the bill and the inability of commodity programs to assist farmers when price increases are met with faster rising costs, or when shocks from the broader economy put agricultural incomes in peril.

[3] Commodity program recipients must comply with certain conservation planning and many low income households must demonstrate efforts in gaining employment or training to qualify.

PURDUE AGRICULTURAL ECONOMICS REPORT

Title	Food Price Outlook for 2023
Author	Jayson L. Lusk
Article ID	*PAER-2023-04*
Date	January 5, 2023
Tags	Food prices, Inflation, Consumer Prices

Last year's food price outlook, which took a look back at prices over the course of 2021, was titled "The Year of Food Price Inflation." Little did we know what was in store, because that title would have been more apt for 2022. Grocery prices rose 12% from November 2021 to November 2022 (November price data from the Bureau of Labor Statistics are the most recent data available at the time of this writing). Grocery prices "only" rose 6.4% over the same time period in 2021. It has been more than 40 years (dating back to the late 1970s) since grocery prices rose at rate now being experienced.

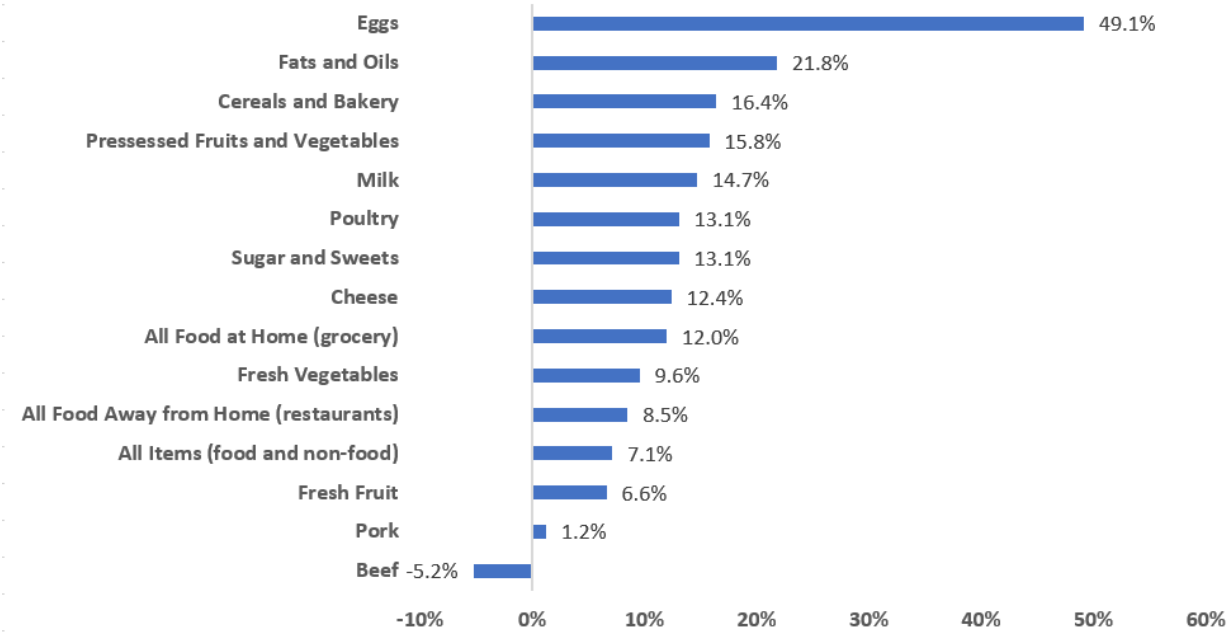


Figure 1. Annual Change in Food and Non-Food Prices (November 2021 to November 2022)

Figure 1 shows the annual increase in prices of major food items. Eggs have experienced the largest annual increase, rising more than 49% over the course of the past year. Avian influenza is the primary culprit for the hike in egg prices. More than 43 million egg-laying hens, representing about 11% of the total number of laying hens in the United States, have been depopulated in 2022 as a result of the disease.

Fats and oils have also experienced a significant rise in prices, increasing 21.8% of the course of the past year. Some have pointed to the rising share of soybean oil going into biofuels as a possible explanation for the increase, but analysis by the Center for Food Demand Analysis and Sustainability at Purdue

University suggest this is only a minor contributor, and as such other factors beyond biofuels are the main drivers.

As shown in figure 1, most food items experienced higher rates of price inflation than did overall prices in the economy. Overall prices in the economy (food and non-food) increased 7.1% from November 2021 to 2022. The only food categories shown in figure 1 that experienced lower rates of food price increases were fresh fruit, pork, and beef. In fact, retail beef prices *fell* over the course of 2022, as producers liquidated breeding stock in response to high feed prices and drought in many parts of the country that affected availability of forage.

Although consumers were initially paying these higher prices without much pushback, there are several lines of evidence that consumers are beginning to tighten their belts. The monthly Consumer Food Insights Survey conducted by the Center for Food Demand Analysis and Sustainability at Purdue showed that back in February 2022, consumers most commonly said they were doing nothing different in response to the higher prices, but by the fall, the most common answers were that consumers were using coupons and switching from brands to generics. By August 2022, consumers reported that food spending was the household budget category causing the most stress. Moreover, an analysis of retail pork grocery scanner data shows that consumers' pork purchases became more sensitive to price changes in 2022 relative to the past five years.

The U.S. Department of Agriculture Economic Research Service is forecasting a return to something closer to "normal" for food prices in 2023. At present, they are projecting grocery prices to increase between 3% and 4% over the course of 2023. Respondents to our Consumer Food Insights Survey also expect a decline in the rate of inflation during 2023. Whether these forecasts bear out remains to be seen. The Federal Reserve interest rate hikes to appear to have had some impact on the overall inflation rate, although this does not appear to have yet trickled down to food. Many analysts are projecting a recession during 2023, which would likely put downward pressure on spending and prices. According to our analysis, spending on fresh fruits and vegetables, and especially on food at restaurants and alcoholic beverages would likely to take the biggest hit if consumer incomes fall. While predicting individual food prices is always risky business, we are likely to see higher beef prices in the years ahead when the current reductions in breeding stock ultimately dent fed cattle inventories.

PURDUE
AGRICULTURAL ECONOMICS REPORT

Title	Dairy Consumption, Production, and Reflections on the Formula Fiasco of 2022
Author	Nicole Olynk Widmar
Article ID	*PAER-2023-05*
Date	January 5, 2023
Tags	Dairy, Milk, Baby Formula
Summary	Anticipated strength in demand for U.S. dairy products have led to raised expectations for 2023 milk prices, now forecast at $22.70/cwt. Total production is expected to increase in 2023, with growth in yield per cow and a slight increase in cow numbers. The infant formula situation in the U.S. continues to be closely watched; imports remain up significantly year-over-year, and we continue to explore the market and policy implications of the situation that developed in 2022.

Taken all together the all U.S. all-milk price forecasts for 2023 has been raised, up 10 cents from the November 2022 forecast to $22.70/cwt, according to the latest USDA Economic Research Service Situation and Outlook report (Dec 2022). The 2023 production forecast for 2023 is up slightly as well (by 0.3 billion pounds), coming from both slighter higher cow numbers (up 5000 head, to 9.420 million head total) and growth in milk (yield) per cow.

Strength in 2023 dairy prices relies heavily on the anticipated stronger demand for U.S. dairy products in 2023. Projections for domestic use are up 0.4 billion pounds to 222.0 billion pounds forecasted in total.

After significant increases in September of 2022, October 2022 imports of "preparations suitable for infant and young children, put up for retail sale", which includes infant formula, decreased 1.0 million pounds. The 1.0 million-pound decline from September to October is notable, but so is the 5.7 million-pound increase from the year prior (October 2021). Continued year-over-year imports evidence a sustained – and continued - challenge in terms of recovery for the formula market in the U.S.

The Formula Fiasco

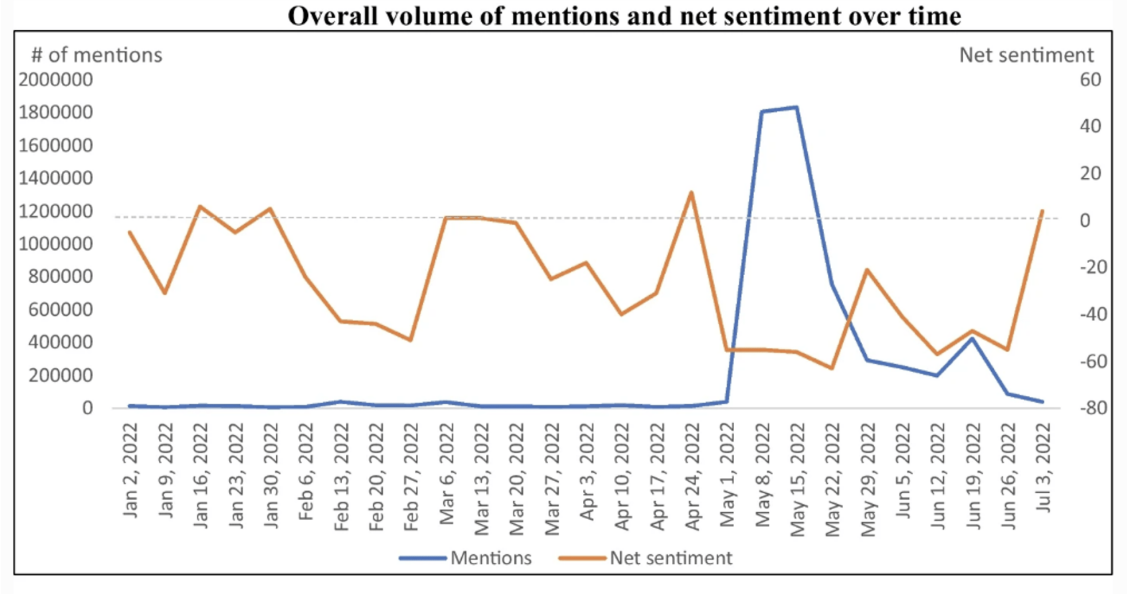
U.S. consumers are guilty of calling things 'shortages' when there is less of it than we would like and prices rise. However, it isn't often (or really, mostly, ever?) that U.S. consumers face legitimate product shortages in the sense that products cannot be found on supermarket or retail shelves for purchase, even with currency in hand and a willing spender. Even more rare is a shortage on a product for which we legitimately have no substitutes. Most products, in fact, nearly all, have substitutes available for replacement of missing or hard-to-source products. But, in the case of specialty and infant formulas, there are few legitimate substitutes, and mostly in the form of another brand and/or container size and not in the form of a substitute or alternative product. You simply cannot 'replace' formula in an infant's diet. With this context – both the uniqueness of the product and the market situation – one can reflect on the legitimate panic faced

by parents and those reliant on formulas for their nutrition during the late Spring, entirety of Summer, and even into the Fall of 2022.

You have undoubtedly heard about, experienced, witnessed or participated in the uncertainty and ultimately panic of the recent U.S. baby formula shortage. What you might not have realized was that months before the May and June 2022 panic, there were warnings (alarm bells, one might say) which went unheeded.

In February of 2022 there was a voluntary recall issued; the FDA announced the recall and released information to consumers about how to identify recalled products (**FDA recall document**). However, there was not significant uptick in online media about infant formula until May 2022, and, even then, the sudden attention on baby formula dissipated within three weeks, despite a continuous rise on out-of-stock rates in late May through mid-June (Fig 1). Shortages of formulas continued into the fall of 2022, although media attention continued to lessen over time.

Adapted from Fig 1. **Volume of mentions and net sentiment over time** from: **The Curious Case of Baby Formula in the United States in 2022: Cries for Urgent Action Months after Silence in the Midst of Alarm Bells.**

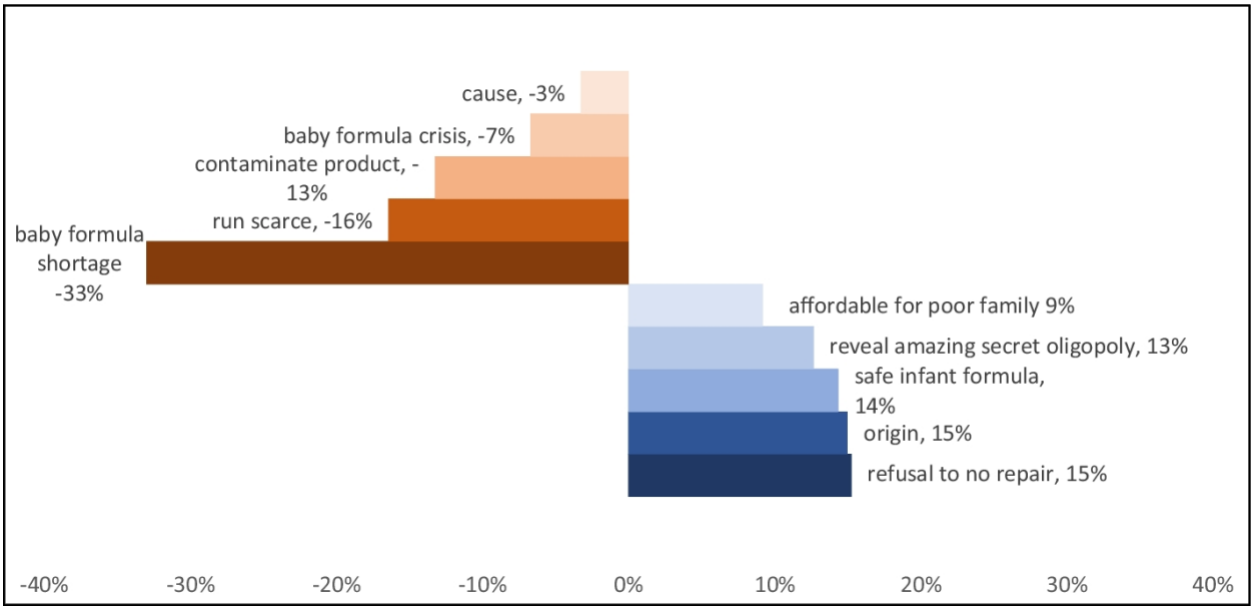


The deterioration of online media attention while threats persist is a known phenomenon. Yet, in this case, one may remain surprised to learn that the first public recognition of the threat was woefully late, and public attention fell rapidly even as physical product shortages were still being widely faced.

As stated in **our recent article**, "The infant formula situation could have been somewhat mitigated if the supply chain warning in the FDA's recall announcement would have been heeded by the public, related industries, and the government when the recall was first issued." And "The lack of timely response, or even timely coverage and educational campaigns to help parents prepare, arguably worsened the panic when physical shortages occurred, seemingly without warning for many people."

When panic struck and online media interest spiked there were most commonly negative sentiments surrounding terms like scarcity, shortage, and crises (Fig 2). Some positive sentiments surrounded attempts to improve affordability or find safe product, but the overwhelming majority of conversations were negative during this time period, as evidenced by the rapid fall in net sentiment in Fig 1.

Adapted from Fig 2. **Sentiment drivers for the infant formula shortage search** from: **The Curious Case of Baby Formula in the United States in 2022: Cries for Urgent Action Months after Silence in the Midst of Alarm Bells**



Given today's rapid dissemination of information and rampant (over-) sharing on social media platforms, how was such an impactful recall largely 'missed' for months? These were valuable months that could have been used to be sure of supplies (if and where possible), or at the very least to inform and educate parents ahead of experiencing physical product shortages. Arguably, we need to learn, in a public policy and communication arena, from **The Curious Case of Baby Formula in the United States in 2022: Cries for Urgent Action Months After Silence in the Midst of Alarm Bells**.

We recently published (December 6th, 2022) an article with additional details and citations exploring the formula crisis; that article is freely available for download: Jung, J., Widmar, N.O. & Ellison, B. The Curious Case of Baby Formula in the United States in 2022: Cries for Urgent Action Months after Silence in the Midst of Alarm Bells. Food ethics ***8****, 4 (2023).* ***Open/Freely Available Access to the Journal Article Available HERE***

PURDUE
AGRICULTURAL ECONOMICS REPORT

Title	2023 Purdue Crop Cost and Return Guide
Author	Michael Langemeier
Article ID	*PAER-2023-06*
Date	January 5, 2023
Tags	Contribution margin, Crop Costs
Summary	Production costs are expected to remain elevated in 2023. Despite this fact, it is not out of the realm of possibility to see positive margins in 2023, particularly for rotation corn and soybeans on high productivity ground.

The 2023 *Purdue Crop Cost and Return Guide*, which is available for free download from the Center for Commercial Agriculture website, gives estimated costs for planting, growing and harvesting a variety of crops, as well as estimated contribution margins and earnings. The guide is updated frequently as grain futures prices change and the costs of inputs, such as seed, fertilizer, pesticides and fuel, fluctuate. This paper discusses estimates made in mid-December.

The guide presents cost and return information for low, average, and high productivity soils. The discussion in this paper will focus on the estimates for average productivity soil. Table 1 presents crop budget information for continuous corn, rotation corn, rotation soybeans, wheat, and double-crop soybeans for average productivity soil. Double-crop soybeans are typically planted after wheat so it is typical to combine the contribution margin for these two crops when comparing to continuous corn, rotation corn, and rotation soybeans. The yield estimates reflect trend yields for Indiana for each crop. The contribution margin, obtained by subtracting total variable cost from market revenue, ranges from $206 per acre for continuous corn to $476 per acre for wheat/double-crop soybeans. The contribution margins for rotation corn and rotation soybeans on average productivity soil are $318 and $389 per acre, respectively. The contribution margin is used to cover overhead costs such as machinery ownership costs, family and hired labor, and cash rent. Failure to adequately cover these overhead costs typically puts downward pressure on cash rent and land values.

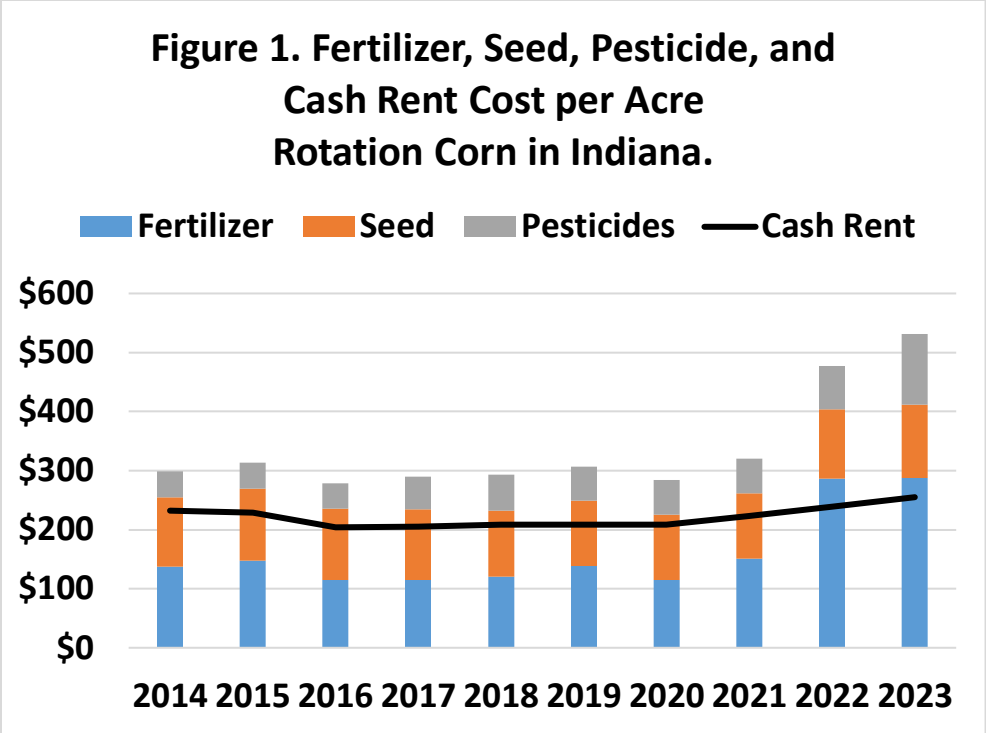
From 2007 to 2013, the contribution margin for rotation corn on average productivity soil was higher than the contribution margin for rotation soybeans. The average difference in the contribution margin was $38 per acre during the 2007 to 2013 period. The situation was considerably different from 2014 to 2022. The average difference in the contribution margin during this period was an advantage for soybeans of $54 per acre. The projected difference in contribution margins between corn and soybeans for 2023 is $71 per acre in favor of rotation soybeans.

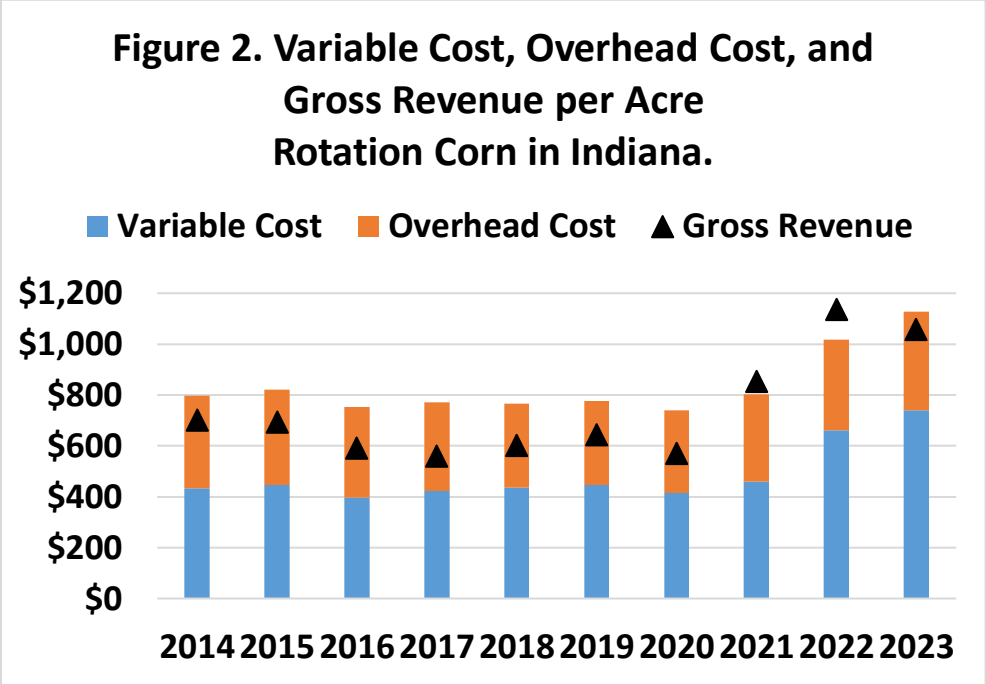
Table 1. 2023 Purdue Crop Budget for Average Productivity Soil.

	Continuous Corn	Rotation Corn	Rotation Soybeans	Wheat	Double-Crop Soybeans
Expected Yield per Acre	173	184	56	79	39
Harvest Price	5.75	5.75	13.60	7.40	13.60
Market Revenue	$995	$1,058	$762	$585	$530
Less Variable Costs					
Fertilizer	318	288	111	164	82
Seed	124	124	74	44	86
Pesticides	126	119	75	45	65
Dryer Fuel	53	42	0	0	5
Machinery Fuel	32	32	20	20	14
Machinery Repairs	34	34	29	29	24
Hauling	18	19	6	8	4
Interest	36	34	17	16	15
Insurance and Miscellaneous	48	48	41	9	9
Total Variable Costs	$789	$740	$373	$335	$304
Contribution Margin	$206	$318	$389	$250	$226
Earnings	-$191	-$69	$2	-$137	$226
Breakeven Price	$6.86	$6.13	$13.57	$9.14	$7.79

See ID-166-W for more detail, December 2022 Estimates.

Figure 1 illustrates the trends in fertilizer, seed, pesticide, and cash rent costs for rotation corn on average productivity soil from 2014 to 2023. Fertilizer costs in 2023 are expected to be similar to those in 2022, but $137 ($0.73 per bushel) higher than costs in 2021. Compared to the previous peak in 2013, fertilizer costs per acre are up $141 per acre ($0.67 per bushel). Cash rent per acre in 2023 is expected to be $255 per acre ($1.39 per bushel) or $26 per acre higher than the most recent peak in 2014. Herbicide and seed costs are expected to be similar to 2022 levels.





Gross revenue (market revenue plus government payments), variable cost, and overhead cost per acre for rotation corn on average productivity soil is illustrated in figure 2. Government payments are expected to zero in 2023. Variable cost per acre in 2023 is expected to be $80 higher than it was in the 2022 budget, which represents a 12.1 percent increase. Variable cost per bushel in 2023 is estimated to be $4.02. Fixed cost (overhead cost) per acre is projected to be $387, which is higher than the previous peak of $375 in

2015. The breakeven price needed to cover variable and fixed costs varied from $4.89 to $4.98 per bushel from 2013 to 2015. In 2016 and 2017, the breakeven price declined to approximately $4.55 per bushel. The breakeven prices in 2018 and 2019 were approximately $4.45 per bushel, respectively. Breakeven prices in 2020 and 2021 were approximately $4.20 and $4.45, respectively. The projected breakeven price for 2022 was $5.59 per bushel, which was 25.5 percent higher than the 2021 breakeven price. In 2023, the breakeven price is expected to increase another 9.5 percent, reaching $6.13 per bushel. Gross revenue for rotation corn in 2023 is expected to be $1,058 per acre or 7 percent lower than gross revenue in 2022. Combining the expected gross revenue for 2023 with total production costs (variable plus fixed costs) results in an expected loss for rotation corn of $69 per acre.

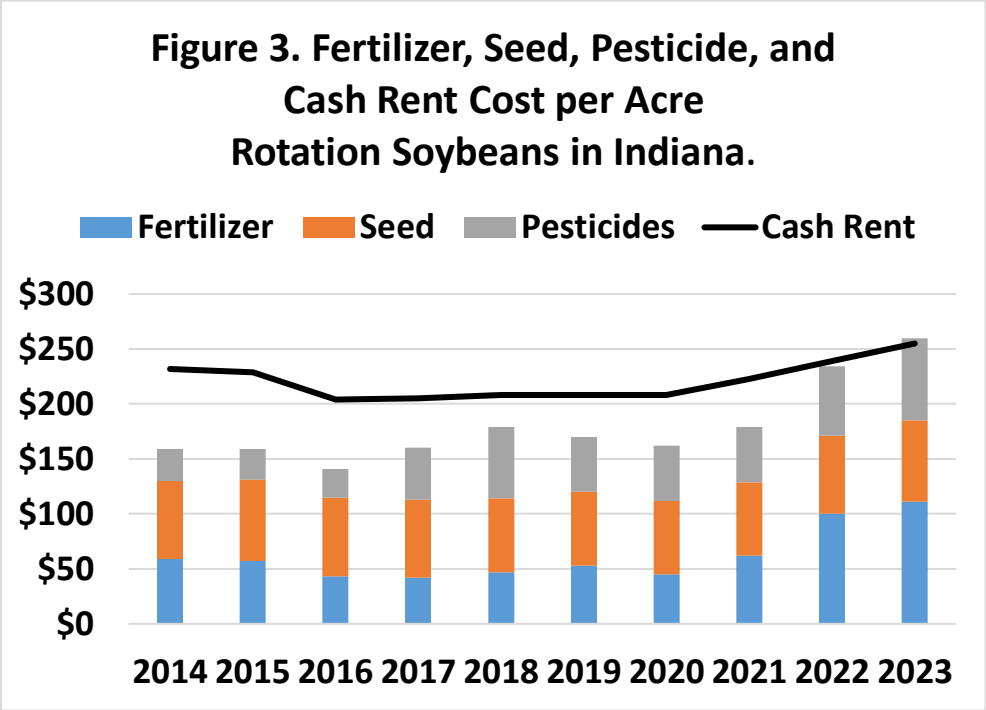
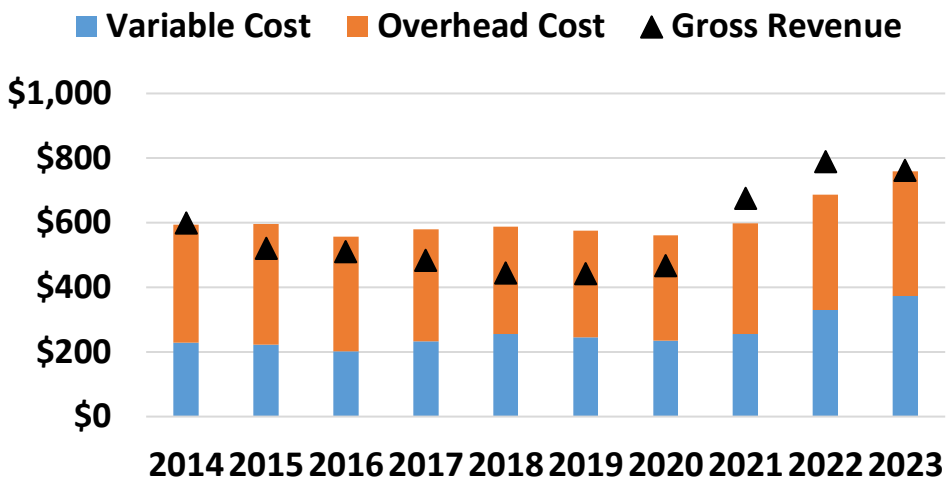


Figure 3 illustrates the trends in fertilizer, seed, pesticide, and cash rent costs for rotation soybeans from 2014 to 2023. Fertilizer and herbicide costs in 2023 are expected to similar to costs in 2022, but substantially higher than those experienced from 2014 to 2021.

Gross revenue (market revenue plus government payments), variable cost, and overhead cost per acre for rotation soybeans on average productivity level is illustrated in figure 4. Government payments are expected to be zero in 2023. Variable cost per acre in 2023 is projected to be $373 per acre ($6.66 per bushel), or approximately 13.4 percent higher than they were in 2022. Like corn, fixed cost per acre peaked in 2015 at $375, and is projected to be $387 per acre in 2023. The breakeven price needed to cover variable and fixed costs is expected to increase from $12.49 in 2022 to $13.57 per bushel in 2023, which represents an 8.6 percent increase. The expected profit in 2023 for rotation soybeans is $2 per acre.

Figure 4. Variable Cost, Overhead Cost, and Gross Revenue per Acre Rotation Soybeans in Indiana.



The breakeven prices for rotation corn and rotation soybeans discussed above were for average productivity land. For high productivity land, the breakeven prices for rotation corn and rotation soybeans are expected to be $5.62 and $12.64 per bushel, respectively. Though the difference in relative profits is smaller than it was on average productivity land, rotation soybeans are expected to be more profitable than rotation corn on high productivity land. The breakeven prices for low productivity land are expected to be $6.72 and $14.98 per bushel for corn and soybeans, respectively. Rotation soybeans are expected to be more profitable than rotation corn on low productivity soil.

In summary, despite substantially higher production costs, it is not out of the realm of possibility to see positive margins in 2023, particularly for rotation corn and soybeans produced on high productivity ground. The higher cost structure along with relatively tight margins, increases the importance of carefully scrutinizing input and crop decisions. Producers are encouraged to create crop budgets and in general improve their record keeping.

PURDUE
AGRICULTURAL ECONOMICS REPORT

Title	2023 Agricultural Credit Outlook
Author	Brady Brewer and Todd Kuethe
Article ID	*PAER-2023-07*
Date	January 5, 2023
Tags	Agricultural lending, interest rates, market outlook
Summary	Increasing interest rates, higher demand for loans, lower repayment rates, and fund availability suggest agricultural credit markets trending downward for 2023.

The agricultural economy in 2022 was marked by low interest rates, increasing land values, and higher farm profits. Overall, it was a good year for farmers balance sheets for both short-term and long-term assets. Liquidity and solvency were direct beneficiaries of the 2022 environment. This article examines the trends in three key parts of the agricultural credit markets: interest rates, the demand for loans, and non-performing loans. We examine data obtained from the two Federal Reserve banks that serve Indiana. As shown in Figure 1, 68 counties in northern and central Indiana are part of the Federal Reserve Bank of Chicago region, and the remaining 24 counties in southern Indiana are part of the Federal Reserve Bank of St. Louis.

Figure 1: Chicago and St. Louis Federal Reserve Districts

Both Federal Reserve banks conduct quarterly surveys of agricultural bankers in their region. The surveys address important issues in farmland and agricultural credit markets. It is important to note that both Federal Reserve regions cover large areas with diverse agricultural sectors. Thus, local conditions may deviate from broad, regional trends. At the time of writing, data for the St. Louis Federal Reserve district were available through the third quarter of 2022 through the Federal Reserve Bank of Kansas City's Agricultural Finance Updates, and data for the Chicago Federal Reserve district were available through the third quarter of 2022 through the bank's AgLetter publication.

Interest Rates

Interest rates climbed through much of 2022. The Federal Open Market Committee (FOMC), a twelve-person committee consisting of members of the board of Governors from the Federal Reserve System and presidents from the eleven Reserve Banks, raised the Fed Funds Rate[1] seven consecutive meetings in 2022. Figure 2 plots the average interest rate on farm operating loans since the first quarter of 1991 for the Chicago Fed district and the second quarter of 2012 for the St. Louis Fed district. Farm operating loans are defined as those used primarily to finance current crop production expenses and the care and feeding of livestock (including poultry). Data for the St. Louis district does not go back as far as the data for the Chicago district does; however, the longer time period is being shown as it helps put perspective on the increases in interest rates that were experienced in 2022.

The latest data available for each of the two Federal Reserve's that cover Indiana is from the 3rd quarter of 2022. Operating loan interest rates for the Chicago Fed district were 6% while operating loan interest rates for the St. Louis Fed district were 6.5%. The fourth quarter 2021 marked the lowest operating loan interest rates had been over the last 30 years. At the beginning of 2022, operating loan interest rates were 4.6% for the Chicago Fed district and 4.74% for the St. Louis Fed district. Interest rates increased 1.9 percentage points for the Chicago Fed district and 1.25 percentage points in the St. Louis Fed district. This is the highest interest rates the Chicago Fed district has seen since the 3rd quarter of 2008 and the highest the St. Louis Fed district has seen since the 3rd quarter of 2019.

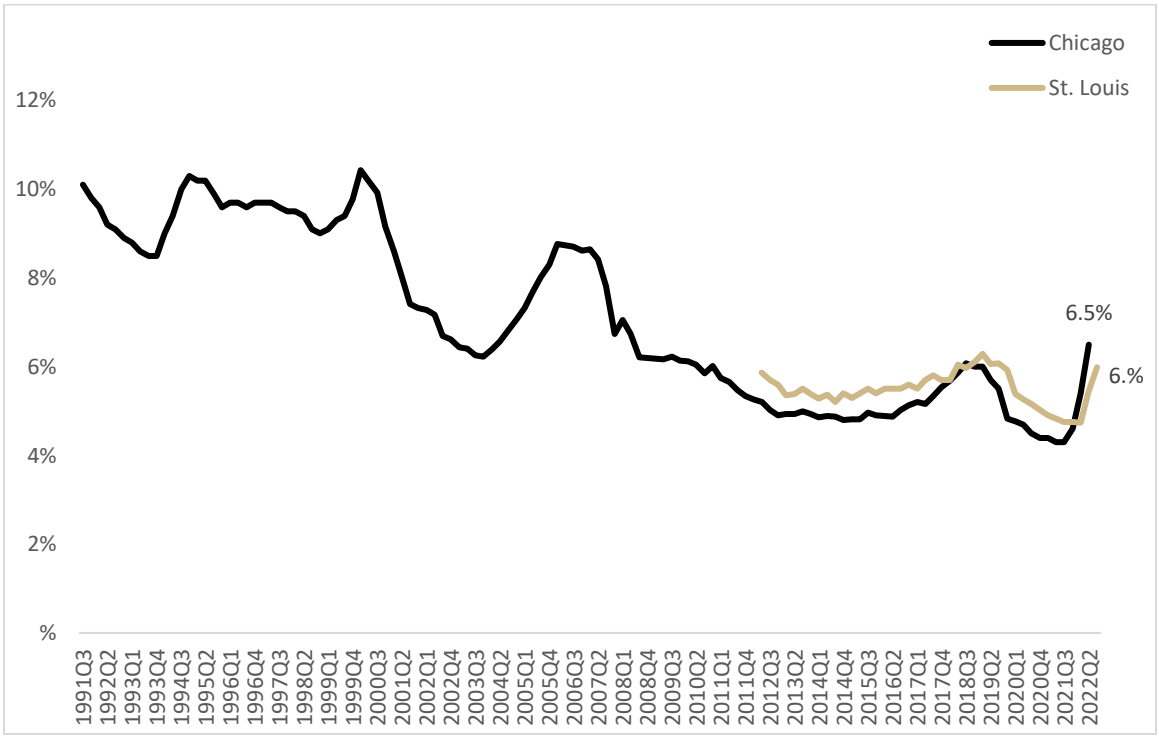


Figure 2 Average Fixed Interest Rate on Operating Loans, 1991Q1 - 2022Q3

Figure 3 plots the average fixed interest rates on long-term farm real estate loans. The most recent survey results suggest an average farm mortgage rate of 6.1% in the Chicago Fed district and 5.95% in the St. Louis Fed district. These interest rates are up 1.7 percentage points in the Chicago Fed district where they averaged 4.4% in the first quarter of 2022 and they are up 1.5 percentage points in the St. Louis Fed district where they averaged 4.45% in the first quarter of 2022. This is the highest farm real estate interest rate since the fourth quarter of 2009 in the Chicago Fed district the highest interest rate since the first quarter of 2019 in the St. Louis Fed district.

[1] The Fed Funds Rate is the interest rate at which deposit granting institution (i.e. banks) trade federal funds with each other.

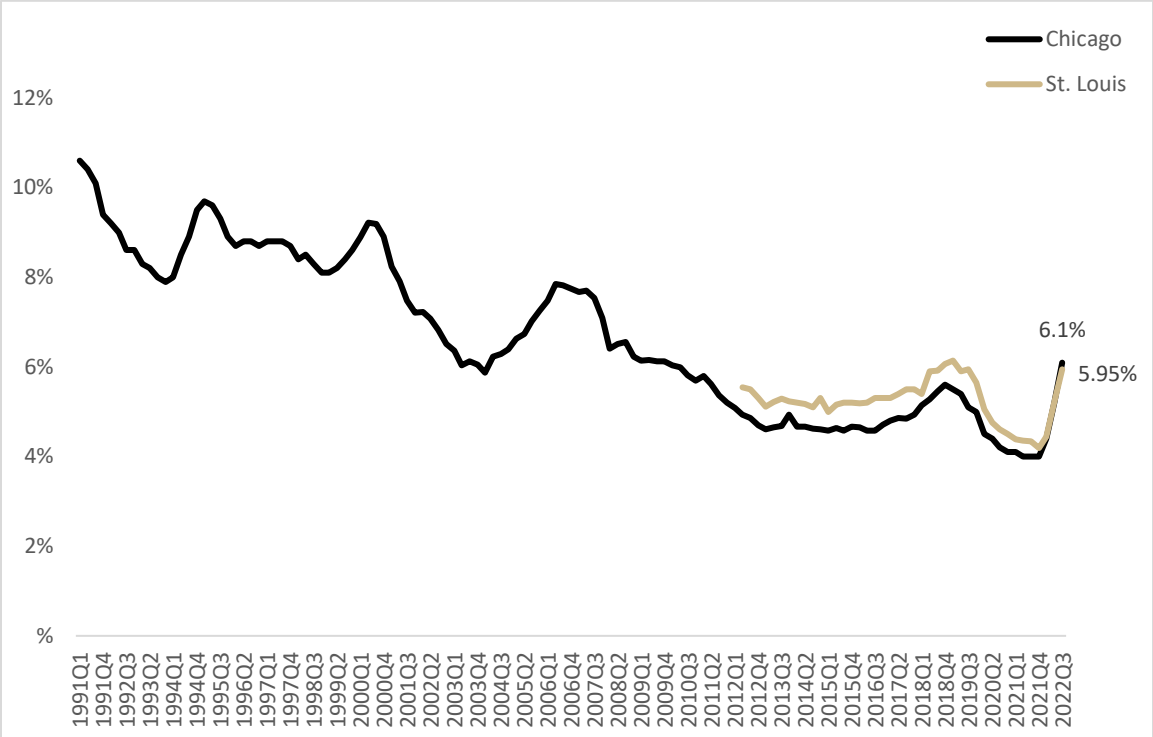


Figure 3 Average Fixed Interest Rate on Long Term Farm Real Estate Loans, 1991Q1 - 2022Q3

One key predictor of where interest rates will go is the Fed Funds rate. Every other FOMC meeting, the "Summary of Economic Conditions" is released. This summary represents the views on the certain economic indicators by the FOMC committee. In this summary, it is expected that the Fed Funds rate will increase another 100 basis points (1 percent) to a target range of 5.1% to 5.4%. If this happens, we could see interest rates rise another 100 basis points through the end of 2023.

Whether this continued increase in the Fed Funds comes to fruition will in large part rest on if the US economy continues to see inflation impacting consumers purchasing power. While it is unlikely that inflation will return to the Fed Reserves target of 2%, if it eases enough, we may see the FOMC put a pause, or at the very least slow down, future increases to the Fed Funds Rate.

Demand for Loans and Bank Condition

The Federal Reserve Bank surveys ask agricultural bankers to rate the demand for loans at their institution relative to a year earlier. Respondents report whether the demand for loans is "higher," "lower," or the "same." These responses are summarized by a loan demand index, calculated as the share of lenders reporting "higher" minus those reporting "lower" plus 100. Thus, when the loan demand index is less than 100, the demand for agricultural loans is decreasing. Figure 4 shows that the demand for agricultural loans decreased in 2022 relative to 2021. However, this sentiment was not as strong as at the end of 2021 and the first part of 2022. While overall demand for loans decreased, less bankers reported the decrease than in 2021. Rising input prices were a significant factor in the increased demand for loans as key inputs such as fuel and fertilizer saw price increases. If this trend continues, this may indicate that farmers will need more loans in 2023 than they did in 2022.

A new development for 2022 compared to previous years is that bankers are now reporting less funds available to loan out than last year. However, this, to date, is not an indication that banks are stressed, instead it suggests that there may be a tightening of deposits and other funds that have been available. This will be something to keep an eye on throughout 2023.

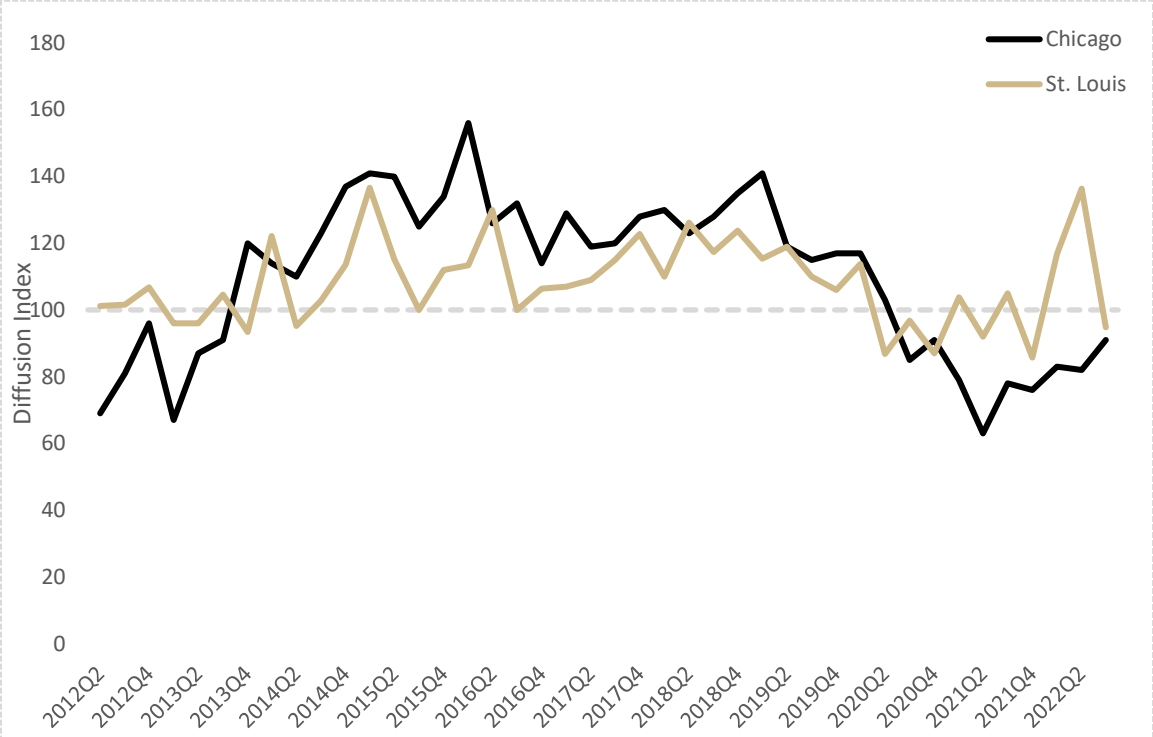


Figure 4 Demand for Agricultural Loans, 2012Q2-2022Q3

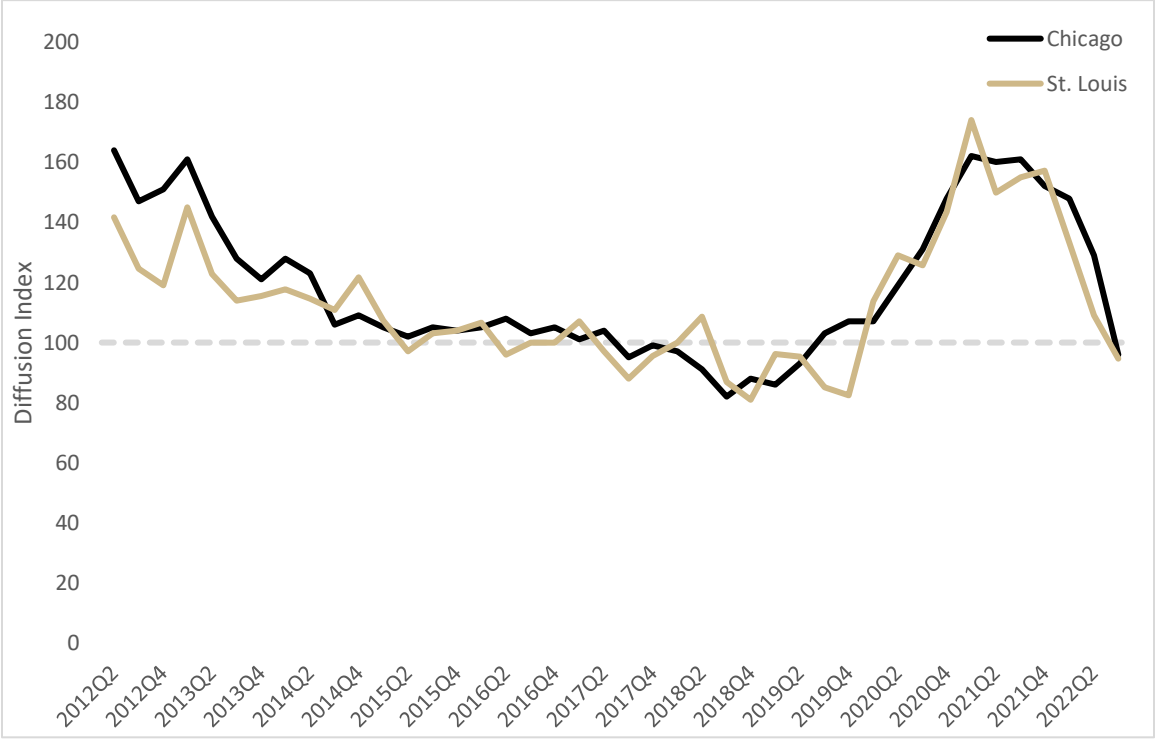


Figure 5 Availability of Funds at Agricultural Banks, 2012Q2 - 2022Q3

Non-Performing Loans

Farmers' rate of loan repayment declined in 2022, a continuation of a trend that started in 2021. The index is similarly constructed based on lenders reported repayment rates relative to the same quarter of the previous year. Given that the loan repayment rate index for Chicago is above 100, the index suggests that farmers were able to pay off a smaller portion of their debt relative to a year ago. The St. Louis Fed index is exactly 100 for the 3rd quarter of 2022, indicating no change in repayment rates from a

year prior. This suggests that repayment rates may be slowing across the region and should provide some caution for the agricultural finance sector.

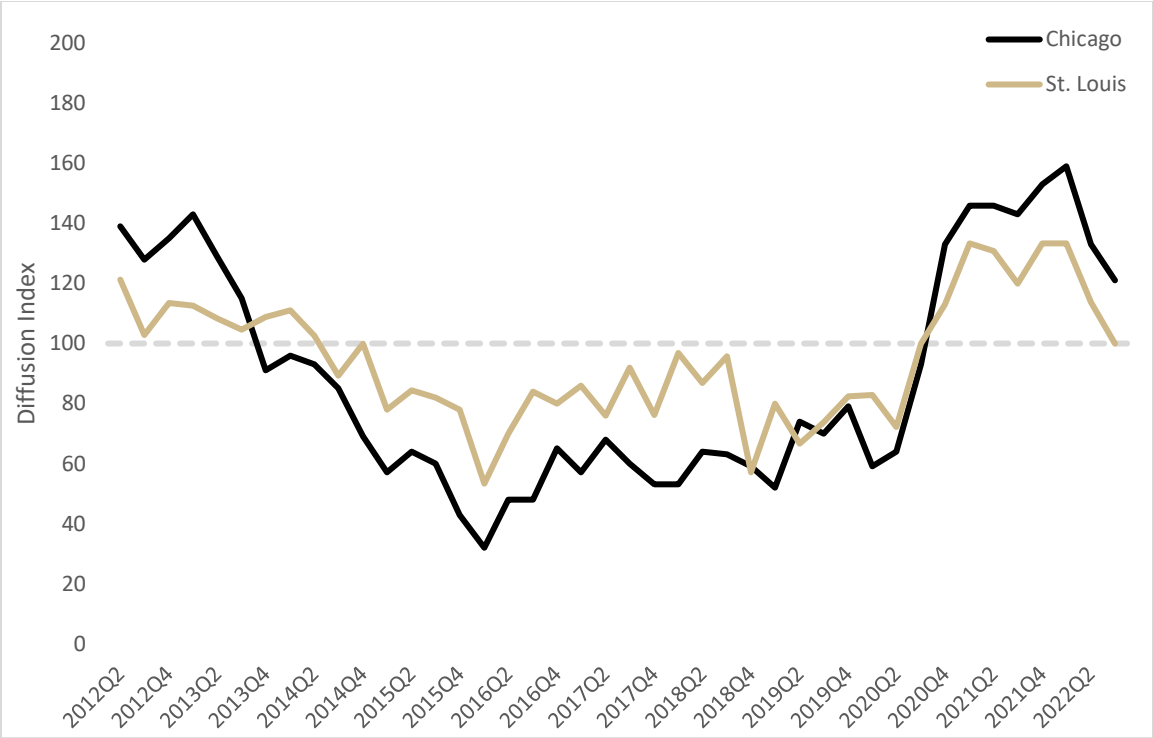


Figure 6 Loan Repayment Index, 2012Q2 - 2022Q3

Overall, the data shows a cautionary tale for the 2023 agricultural credit market. Farm incomes were up in 2022, which increased liquidity for much of the agricultural sector. Despite the increase in farm income, bankers reported lower rates of repayment from farmers they lend to. Additionally, demand for loans is on a trajectory such that farmers will have an increased demand for loans while bankers report less funds available to loan. Interest rates are also on an upward trajectory. If the Fed Funds Rate continues to increase over 2023 by 100 basis points, we can expect the interest rate the farmers pays to raise similarly. While these indicators may seem negative, it should be reiterated, that the data presented here looks at year over year changes and we are coming off of a two-year period with high farm incomes. Thus, even if the ag credit market takes a step back, or even two, it is still well positioned to serve the agricultural sector. Farmers need to aware that interest rates, and thus their cost of debt, is likely to continue increases. Being proactive in locking in interest rates may be beneficial to control how much is spent on interest.

References

Federal Open Market Committee (2022) "Summary of Economic Projections" Federal Reserve

Federal Reserve Bank of Kansas City (2022) "Ag Finance Updates" Third Quarter Federal Reserve District Ag Credit Surveys.

Oppedahl, D. (2022) "Farmland Values and Credit Conditions" *AgLetter* No. 1998, Federal Reserve Bank of Chicago.

PURDUE AGRICULTURAL ECONOMICS REPORT

Title	2023 Farmland and Cash Rent Outlook
Author	Todd Kuethe
Article ID	*PAER-2023-08*
Date	January 5, 2023
Tags	Farmland prices, cash rents
Summary	Farmland prices are expected to continue to grow through 2023. Cash rental rates are also expected to increase in 2023.

Farmland Values

All signs point toward continued growth in Indiana farmland prices through 2023. In 2022, farmland prices across Indiana set a new record high, at $12,808 per acre for top quality land, $10,598 for average quality land, and $8,631 for poor quality land. Perhaps more important, farmland prices grew at a record pace between 2022 and 2023, at just over 30% for all land quality classes. While this pace of growth would be difficult to sustain, current indicators suggest farmland prices are expected to increase at a more modest rate.

The Purdue Farmland Values and Cash Rent survey is conducted in June of each year. The most recent iteration of Iowa State University's land value survey, released on December 13 2022, found that farmland values across Iowa increased by 17% between November 2021 and November 2022, following a 31% increase the preceding year. In addition, the most recent agricultural banker survey by the Federal Reserve Bank of Chicago found that farmland prices suggest that land values continued to increase across their district, which includes northern portions of Indiana and Illinois, southern Wisconsin, the lower peninsula of Michigan, and all of Iowa. However, the survey suggests that the pace of growth has slowed since the final quarter of 2021.

The growth in farmland prices across the Corn Belt are supported by higher commodity prices, increased demand for conversion to nonagricultural uses, and the overall strength of the farm economy. However, the potential for growth may be limited by fear of a reversal in any of these factors, as well as increasing costs of agricultural production. In addition, the upward pressure on farm mortgage rates places downward pressure on transaction prices.

Cash Rental Rates

Cash rental rates are also expected to increase in 2023. The recent 2023 Purdue Crop Cost & Return Guide suggests that the contribution margin, the difference between market returns and variable costs, is expected to increase in 2023 for both rotation corn and rotation soybeans. Increasing margins generally signals upward pressure on cash rental rates, as farm operators will have additional revenues to allocate to labor, investment, and land. As shown below, the contribution margin for average quality farmland has exceed average cash rentals rates in 2021 and 2022, which also places additional pressure on cash rental

rates. However, farmers will no doubt stress the increased costs in other expense categories when trying to negotiate less aggressive cash rent hikes.

Figure 1: Cash rental rate and contribution margin for rotation corn and soybeans for average quality land, 2010-2023