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Income Losses Due to COVID-19 for US and Wisconsin Commodity Crop Farmers

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The coronavirus pandemic has been wreaking havoc on agricultural markets and production processes, with farmers having to dump milk and euthanize livestock. In this blog, I present estimates of the economic losses to corn, soybean, and wheat farmers due to the rapid price declines from COVID-19. These are the three most important commodity crops in the US and Wisconsin in terms of planted acres, crop value, crop insurance liability and farm program payments.

This estimate of COVID-19 impacts on commodity crop farmers begins with price impacts, focusing on the USDA national marketing year average price (also called the season-average price). This price is the USDA's estimate of the national average price received by farmers, weighted by the region and time of sale. The marketing year runs for twelve months, beginning September 1 for corn and soybeans and June 1 for wheat in the US. It is also the price that the 2018 Farm Bill support programs ARC and PLC use to determine payments. If ARC and/or PLC payments are triggered for the 2019 crop, they will begin to pay farmers for losses in September of 2020 after the 2019 marketing year ends, and in September 2021 for the 2020 crop. As I write this post, much of the marketing year average price is already set, especially for wheat. USDA has announced prices for 8 of the 12 months for the 2019 corn and soybean marketing year and 11 of the 12 months for wheat.

Price Declines

Table 1 reports the price impacts based on USDA Economic Research Service price forecasts (USDA-ERS 2020). Pre-COVID prices are for Feb 6, 2020, while post COVID prices are for May 7, 2020 as published on May 12, 2020 (USDA-ERS 2020). Estimates for 2019 already account for the 8 or 11 months of prices already known for the marketing year, while USDA-ERS's estimates for 2020 are based on futures markets and historical basis adjustments to derive a farm price estimate.

Table 1. Price declines for corn, soybean, and wheat farmers	**------Corn -----**		**------ Soybean ------**		**---- Wheat ----**	
	2019	**2020**	**2019**	**2020**	**2019**	**2020**
Pre-COVID Price ($/bu)	$3.72	$3.88	$8.61	$8.94	$4.61	$4.92
Post-COVID Price ($/bu)	$3.52	$3.31	$8.53	$8.18	$4.61	$4.90
Price Decline due to COVID ($/bu)	**$0.20**	**$0.57**	**$0.08**	**$0.76**	**$0.00**	**$0.02**
Percentage Decline	**5.4%**	**14.7%**	**0.9%**	**8.5%**	**0.0%**	**0.4%**

Source: USDA-ERS 2019 Season Average Price Forecast on Feb 6 (pre-COVID) and May 7 (post-COVID) (USDA-ERS 2020). USDA-ERS 2020 pre-COVID forecast for Feb 1 from Table 3 in Schnitkey et al. (2020).

For corn, the price decrease is $0.20/bu for the 2019 crop and $0.57/bu for the 2020 crop. For soybeans, it is $0.08/bu for the 2019 crop and $0.76/bu for the 2020 crop. For wheat, price changes are minimal: no change for the 2019 crop and $0.02/bu for the 2020 crop. Price impacts for the 2019 crop are smaller because prices for much of the marketing year have already been set. Price impacts are

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relatively larger for corn than soybeans because of the large impacts of COVID-19 on ethanol demand and low oil prices. Wheat has seen little price effects because market uncertainty has been offset by demand for a staple food, trade restrictions in many nations to protect domestic wheat stores and increasing strength of the dollar as a currency.

US Farm Income Losses

Table 2 reports acreage and yield data and the implied income losses due to these price declines. The decline in the marketing year average price is multiplied by crop production, giving the estimated decrease in farm income for each crop year. Most of the 2019 data are final estimates from USDA reports, while values for 2020 use various USDA projections.

Table 2. Income loss for US corn, soybean, and wheat farmers	**------Corn -----**		**------ Soybean ------**		**---- Wheat ----**	
	2019	**2020**	**2019**	**2020**	**2019**	**2020**
US Planted Acres (million)	89.7	97.0	76.1	83.5	45.2	44.7
US Harvested Acres (million)	81.5	89.4	75.0	82.7	37.2	37.8
US Yield (bu per Harvested Acre)	168.0	178.5	47.4	50.5	51.7	48.2
US Production (billion bu)	13.692	15.959	3.558	4.177	1.920	1.824
US Farm Income Loss ($ billion)	**$2.74**	**$9.10**	**$0.28**	**$3.17**	**$0.00**	**$0.04**

Source: 2019 data from WASDE (USDA 2020a); 2020 planted acres from USDA Prospective Plantings (USDA 2020b); 2020 harvested acres calculated by multiplying the 2020 ratio of harvested to planted acres in USDA Agricultural Projections to 2029 (USDA 2020c) by planted acres; 2020 yield from WASDE (USDA 2020a); 2020 production calculated based on harvested acres and yield.

Table 2 shows that the estimated impact on farm income for the 2019 season is a loss of more than $2.7 billion for corn farmers and almost $0.3 billion for soybean farmers, for a total loss of $3.0 billion. Note that many farmers have already sold some or all of their crops (or used it for feed) before these price impacts happened. These losses are the average over all bushels sold during the entire marketing year, so the losses are much larger for those bushels sold more recently or yet to be sold. The 5-year average amount of corn sold from Feb to Aug is 46% and 38% for soybeans (USDA ERS 2020), indicating how much grain has been impacted by lower prices – almost half of the corn crop and more than a third of the soybean crop.

Table 2 shows that the estimated impact on farm income for the 2020 season is a loss of $9.1 billion for corn farmers and almost $3.2 billion for soybean farmers, for a total loss of almost $12.3 billion. These losses are expected losses for a crop that is still being planted. Growing season weather is unknown and substantial positive and negative demand shocks are possible. As a result, actual losses could vary substantially from the projected losses in Table 2 for the 2020 crop. Whatever the final declines in marketing year average prices are, most farmers will bear these costs, as few farmers used forward or futures contracts to sell much of their 2020 crop before Feb 2020.

Wisconsin Farm Income Losses

Table 3 reports acreage and yield data and the implied losses for Wisconsin farmers due to the price declines in Table 1. Again, the decline in the marketing year average price is multiplied by crop production, giving the estimated impact on farm revenue for each crop year, and most of the 2019 data are final estimates from USDA reports, while values for 2020 use various projections. Note that harvested acres includes acres harvested for silage and the yield is an acreage and production weighted

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average of the yield per harvested acre for grain corn and silage corn using a grain equivalent of 8.1 bushels per ton for silage. Harvested acres for 2020 are calculated from planted acres using the 10-year average ratio of total harvested acres (grain and silage) to planted acres. Yields for 2020 are trend yields based on a linear regression using yields for the last 30 years.

Table 3. Income loss for Wisconsin corn, soybean, and wheat farmers	------Corn -----		------ Soybean ------		---- Wheat ----	
	2019	2020	2019	2020	2019	2020
WI Planted Acres (million)	3.80	3.90	1.75	1.95	0.195	0.160
WI Harvested Acres (million)	3.71	3.84	1.69	1.93	0.150	0.141
WI Yield (bu per Harvested Acre)	159.2	167.8	47.0	47.1	64.0	74.7
WI Production (Million bu)	591	645	79.4	90.8	9.60	10.51
WI Farm Income Loss ($ million)	**$118**	**$368**	**$6**	**$69**	**$0.00**	**$0.21**

Source: 2019 data from Quick Stats Lite (USDA 2020d); 2020 planted acres from USDA Prospective Plantings (USDA 2020b); 2020 harvested acres calculated by multiplying planted acres by 10-year average of harvested to planted acres ratio; yield is acreage weighted average of grain and silage yield using 8.1 bushel per ton grain equivalent (Lauer 2017) and harvested acres and yields for grain and silage (USDA 2020d); 2020 production calculated based on harvested acres and yield.

Table 3 shows that the estimated impact on Wisconsin farm income for the 2019 season is a loss of $118 million for corn farmers and $6 million for soybean farmers, for a total loss of almost $125 million. Losses are largest for corn farmers as Wisconsin has relatively more corn acres and the price impacts are larger for corn. ***Estimated losses in Wisconsin farm income for the 2020 season is a loss of $368 million for corn farmers and $69 million for soybean farmers and $210,000 for wheat farmers, for a total loss of almost $437 million.***

Existing Farm Safety Net

Farmer compensation for these and other losses are already built into the existing farm safety net – the ARC and PLC programs and federal crop insurance. Farmers completed their ARC/PLC elections and enrollment on March 16, 2020, with 75% of US corn base acres and 93% of US wheat base acres enrolling in PLC and 80% of US soybean base acres enrolling in ARC (USDA-FSA 2020). I expected Wisconsin farmers followed a similar pattern in terms of program choice. Most farmers also buy crop insurance, especially for corn and soybeans, with most farmers using Revenue Protection with coverage levels of 70%, 75% and 80%. Policy decisions for the 2020 crop were also made by March 16, 2020, before COVID-19 impacts were really understood.

The PLC effective reference price for corn is $3.70, $8.40 for soybeans and $5.50 for wheat. The marketing year average prices for 2019 in Table 1 imply a, $0.18/bu PLC payment rate for corn base acres and an $0.89/bu payment rate for wheat base acres, but no PLC payments for soybeans. ARC payments are likely for soybean base acres in many counties given the 2019 production issues and the $9.63 benchmark price used to calculate county revenue guarantees. Also, a small but significant proportion of farmers chose ARC-IC for 2019, since they could expect large payments if they had zero or very low yields in 2019 due to prevented plant or production issues. The main point is that most farms are expecting large PLC and ARC payments beginning in September of 2020 for the 2019 crop.

For the 2020 crop, prices to calculate revenue guarantees for corn and soybean insurance were established based on harvest time futures contracts prices in February before the COVID-19 substantially impacted commodity markets. As a result, the base prices for corn is $3.88/bu and $9.17/bu for soybeans. With 70% to 80% revenue coverage level, farmers need revenue losses of 20% -

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30% before triggering indemnities. Current futures prices for harvest time futures are roughly 14% lower for corn and 8% lower for soybeans due to the price declines. The implication is that, if these futures prices hold, even moderately-below average yields, especially for corn, will trigger crop insurance indemnities for farmers, compensating them for losses due in part from COVID-19 caused price declines. On top of this insurance coverage, the marketing year average prices for 2020 in Table 1 imply PLC payments for corn and wheat base acres, and likely again ARC payments for soybeans.

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