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Producer margins in a high-expense and high-price environment

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Research Report

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Note from CAPI

Pandemic-induced inflation and supply shortages have caused increases in input costs for Canadian agriculture, a rising trend that began before 2022. However, prices rose even higher in 2022, mainly exacerbated by the invasion of Ukraine and spiking energy costs. Such dramatic increases in input costs, primarily fertilizer, seed and fuel, added additional upward pressure for Canadian farmers, by directly affecting their margins. While it is true that, last fall, a lot of farmers forecasted their fertilizer needs and locked in a price with a supplier for the following spring, many others believed, at the time, prices would not go higher and held out for a better price. On the other hand, crop prices have significantly increased in 2022 and are predicted to remain elevated beyond this year.

In a high expense and high crop price environment, it is important to understand the net effect on farm contribution margins and consequently if farmers will be worse off than what they expected when cropping decisions were made. This research undertaken by CAPI adds value to this discussion of a significant importance to farmers, policymakers, and others by providing a high-level empirical analysis of the situation in Alberta and Ontario and making recommendations from a policy perspective.

Key Takeaways

- Both expenses and revenue were higher for Alberta farmers than what were expected, up to 20% and 47% higher than expected, respectively. The result is a positive increase in contribution margins from the initial forecast.
- In Ontario, expenses increased by up to 24% and revenue increased by up to 30%. Once again margins are higher than initially forecasted in crop budgets.
- While the increase in crop prices offset increases in expenses, farmers were exposed to a scenario where uncertainty and market volatility left them exposed to the potential for significant revenue loss and corresponding margin decline.
- The policy context, including the risk management framework and tools, should reflect and adjust to this new reality where farmers face increased costs and increased risk, which may be offset by increased crop prices, but which may not be.

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Introduction

Agricultural prospects for 2022 were dominated by concerns relating to cost pressures even before the Ukraine invasion by Russia. Inflationary pressures, increased global demand, spiking energy costs (especially natural gas), and supply-side factors such as Covid-driven disruptions at manufacturing plants and shipping delays, are additional factors beside the Ukraine war that have affected both the availability and the prices of crop inputs. Additionally, China has slowed down or stopped production at many fertilizer plants to conserve electricity due to rolling blackouts and has blocked fertilizer exports to protect local users from high global prices. However, undoubtedly, the Russia-Ukraine war has led to a significant increase in farm input prices in 2022, much sharper than what is had been anticipated at the end of 2021.

Canadian farmers were among the first to see the negative impacts of Russia's invasion of Ukraine. Both Canada and Russia are among the largest fertilizer exporters. In 2021, Russia was the leading exporter of nitrogen fertilizer and the second-leading exporter of potassium and phosphate fertilizers (Farm Credit Canada, 2022b). Canada has also imposed a 35 per cent tariff on fertilizer from Russia and Belarus and has barred Russian ships from docking at Canadian ports. These sanctions created prospective supply challenges to spring fertilizer supplies in Ontario, Quebec, and Atlantic Canada. Farmers were faced with uncertainty, not knowing fertilizer prices or if they could secure fertilizer supplies before planting began.

In April 2022, the Government of Canada stated that "the invasion of Ukraine – and the significant sanctions imposed on Russia's economy-have jolted commodity markets with a surge in prices. With sanctions likely to remain for some time and a longer-term strategic shift away from Russian resources in some parts of the world, certain commodity prices are poised to remain elevated and volatile. Political unrest from food insecurity and geopolitical position will continue to create volatile markets for Ontario grains" (Sharma, 2022).

CConsequently, Canadian agriculture felt the shock to the markets, experiencing high demand and high prices for the crops, mainly Canadian grain. Additionally, input suppliers around the world are experiencing challenges to meet the demand for major crop inputs, especially fertilizer. While it is true that, in fall 2021, a lot of farmers forecasted their fertilizer needs and locked in a price with a supplier for spring 2022, many others believed, at the time, prices would not go higher and held out for a better price.

All four fertilizer categories- Nitrogen, Phosphorus, Potassium and Sulphur increased in price. Nitrogen, the most in-demand and critical to plant growth, has surged the most. Data compiled by Farm Credit Canada suggests urea nitrogen fertilizer prices have increased by 148 per cent from $550/tonne in 2020-21 to $1,365/tonne in 2022-23 (Farm Credit Canada, 2022a). According to the World Bank, fertilizer costs have risen steadily since the third quarter of 2021, reaching levels unseen since the 2008 financial crisis (Snobelen, 2022). Given the importance of fertilizer as a farm input, price hikes will increase cost of production, pressuring producer margins (Agriculture, Forestry and Rural Economic Development, 2022).

According to the Ontario Grain Farmer (Sharma, 2022), input costs were rising before the pandemic and have intensified since. The prospect of shrinking margins despite high grain commodity prices are a function of high fixed costs and the drastic increase in variable costs- notably the prices of fuel and fertilizers. According to Statistics Canada's Farm Input Price Index, since the COVID-19 crisis began, the average cost of farm inputs has increased by 14 per cent, with fuel and fertilizers being the primary drivers. These increases do not incorporate the indirect cost of the federal carbon tax, which increased by 102 per cent between 2019 and 2022, adding an additional $54 per acre.

On the other hand, crop prices have increased as well. For 2022-23, crop prices in general are predicted to remain relatively strong, even as world prices fell somewhat through summer 2022. Nevertheless, it is important to emphasize the market outlook for major grains and oilseeds continues to be uncertain on a combination of strong demand and tight supplies (Agriculture and Agri-Food Canada, 2022). While total expenses and the break-even price for commodities are expected to increase in 2022, that doesn't necessarily mean that farmers will be worse off. Ultimately, the price of crops and whether it can more than carry the increases in expenses will determine farmers' profitability in 2022.

Focused Research Question

Given the situation in the current year of both higher input and output prices, it is important to understand how increased crop prices and revenue compare with higher production costs relative to pre-plant expectations. What is the net effect on farm contribution margins caused by these simultaneous increases?

Contribution margin is defined as the difference between total revenue and total variable expenses, which represents the amount of net revenue remaining to apply against fixed costs and return to management and equity.

Methodolgy

Data availability on the input prices for both provinces is limited. Alberta Crop Budget Planning[1] (Agriculture, Forestry and Rural Economic Development, 2022), Ontario Field Crop Budgets[2] (OMAFRA, 2022), Average Farm Input Prices for Alberta[3] (Agriculture and Irrigation, 2022), and the Ontario Farm Input Monitoring Project Survey for October 2021 were used to obtain baseline values on expected input and crop prices and yields for 2022, as well as estimates of costs from other sources (chemical, hail/crop insurance, trucking & marketing, fuel, oil & lube, etc.).

Baseline values for fertilizer prices (nitrogen (N), phosphorus (P), and potassium (K)), seed costs, and fuel prices are based on the 2021 fall reported values (October 2021) for both provinces. This summarizes the information that was available to farmers when deciding what crops to grow. Prices for potash for Alberta were estimated using DTN survey reference prices, the historical Farm Input Price Index, and anecdotal validation testing.

The method used to assess crop returns in this environment is to draw upon these budget reports to calculate contribution margin and compare the expected costs in late 2021 when cropping plans were made with the spring 2022 costs as incurred as an indicator of likely actual net returns. It must be noted that deferred spring prices are indicative of the margin that could be locked in at harvest if forward priced in the spring. A third scenario is included in the analysis as well to account for the farmers who waited till harvest to sell the crop rather than lock in the price in the spring. Contribution margin is defined as the difference between total revenue and total variable expenses, which represents the amount of net revenue remaining to apply against fixed costs, and return to management and equity.

Partial information on the actual seed costs, fertilizer prices, and fuel prices for 2022 was obtained from the Alberta Agriculture, Forestry and Rural Economic Development and the Ontario farm input monitoring project survey for May 2022. Prices of diesel fuel (marked farm fuel-provincial allowance deducted) are entered in the Manitoba calculator guide to convert them from $/l into total $/acre for each crop.

Data on deferred crop prices for October 2022 delivery was obtained from Price and Data Quotes website (Price & Data Quotes, n.d.) for Alberta and from Grain Farmers of Ontario (Daily Commodity Report) for Ontario. The average of October 2022 deferred prices for the selected crops during the period mid-April - May 2022 was used to calculate the actual revenue that could be locked in at harvest by farmers. The average of October spot prices was used to calculate the fall 2022 spot revenue.

This analysis assumes that both expected crop yields and costs from various sources except fertilizer, fuel, and seeds, are as per budgeted values for 2022. Therefore, the reported results on the effect of input and output price increase on the selected crops are at expected yield.

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1 Cropping Alternatives are yearly regional costs and returns forecast reports published by the Alberta government based on current Alberta cost of crop and forage production information on the most commonly grown field crops across the province. These reports are designed to assist grain, oilseed, pulse crops and forage producers make better crop planning decisions by using information from their own farm and soil type.

2 Ontario Field Crop Budgets or Publication 60, published by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) each year, is a tool to help farmers prepare their budgets. This is an annual guide that details cost estimates across a variety of field crops and allows an individual farmer to input details specific to their farm. This allows farmers to easily estimate their profit margin and break-even prices for the upcoming year.

3 The Statistics and Data Development Section of Alberta Agriculture, Forestry and Rural Economic Development carries out a monthly survey of prices for selected Alberta farm inputs.

The discussion motivates a framework on how to conceptualize increases of input prices into production costs. Cost of inputs presented in crop budgets or Ontario input survey act as a filter to give a clear picture of the actual net returns' implications. For example, for Ontario, the 2021 fall average price for 28-0-0 Urea Ammonium Nitrate (UAN) solution was $487 per tonne. This price increased to $945 per tonne in May 2022 when corn planting actually occurred (an increase of 94%). For Ontario grain corn, this increase in UAN prices increased production costs from $109.9/acre to $213.3/acre. The resulting cost increase per acre, identified through the Ontario farm input monitoring project surveys and the 2022 field crop budget, is now more clear.

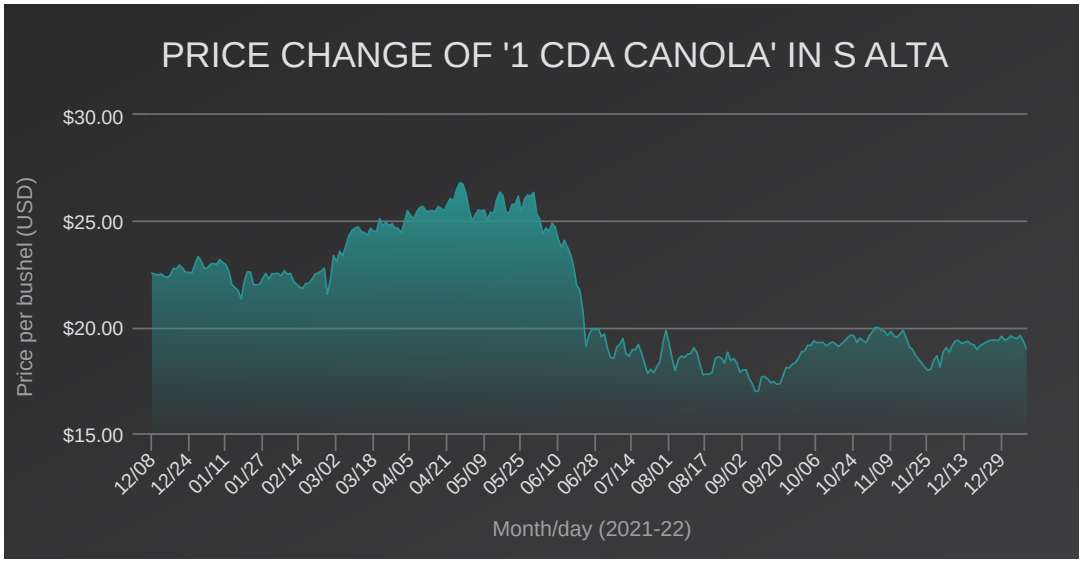
Results

Alberta

To provide insight on how the jump in key input prices (fertilizer, seed, and fuel) has affected the cost of production and how the jump in output prices has affected the revenue, we use the data reported by the 2022 Crop Budget Planning report and the October 2021 prices as a baseline scenario. Canada Prairie Spring (CPS) wheat and canola from the Alberta Brown Soil Zone are selected to estimate production costs and returns. Fertilizer and fuel are two primary expenses in producing crops that have experienced price increases. After inspecting the cost of production impacts due to changes in fertilizer and fuel, next the cost of production impacts of the seed price increase was added in.

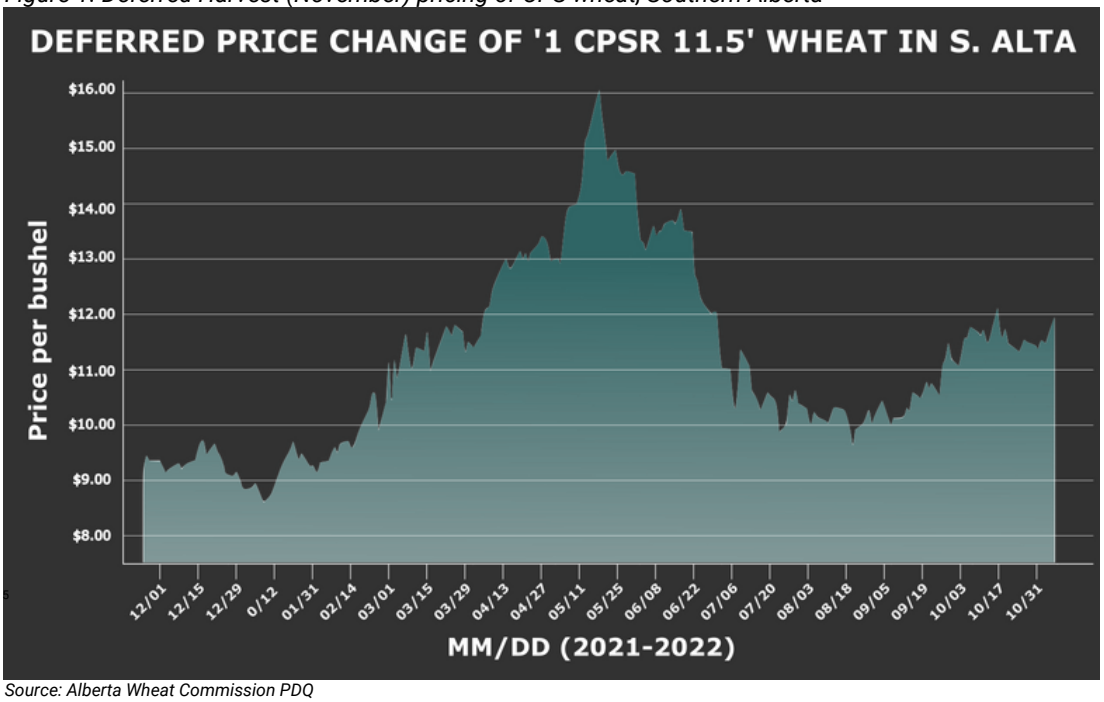
Figure 1 below presents deferred canola pricing data for Southern Alberta. The figure shows that the forward price for new crop canola delivered at harvest increased throughout the winter and spring of 2022, to around $24/bushel at the time of seeding. By the time of harvest in fall 2022 prices had declined but were still just under $20/bushel. Figure 2 below presents deferred CPS pricing in Southern Alberta. The general trend was consistent with canola, with new crop deferred prices increasing through winter and spring 2022, followed by a decline during the growing season and more recently increasing prices. In the spring seeding period, wheat prices for harvest delivery ranged between $12-13/bushel and increased into mid-May to$16/bushel. Wheat prices decreased significantly through the growing season, rallying back to $11-12/bushel in the harvest period.

Figure 1. Deferred Harvest (November) Pricing of Canola, Southern Alberta.



Source: Alberta Wheat Commission PDQ

Figure 1. Deferred Harvest (November) pricing of CPS wheat, Southern Alberta



Source: Alberta Wheat Commission PDQ

Fertilizer prices increased from October 2021 to May 2022 with nitrogen experiencing the highest increase of about 70%. Diesel fuel prices also increased during this period in the range of $1.22/l - $1.65/l. Seed costs were also high in 2022 relative to what was reported in October 2021, with wheat seed costs increasing by 8% and canola wheat seed costs increasing by 6%. Table 1 provides detailed information on the price change for fertilizers, fuel, and seed cost.

The observed prices for crops were high compared to expected values reported in the crop budget for Alberta (Table 2). Compared to the 2022 crop prices farmers expected[4] when making the cropping decision ($9.75/bu) the October 2022 deferred price for CPS wheat that farmers could have locked in at harvest increased by about 38%. The deferred canola price for October 2022 that farmers could have locked in during the April-May 2022 period was also significantly higher compared to what was expected based on the crop budget reported values, at about 47% higher. Both spot prices are slightly lower than the spring deferred values but still higher than the expected market price.

Table 1. Input price change in 2022 relative to October 2021.

	October 2021 Price	May 2022 Price
Nitrogen 46-0-0, Urea, bulk ($/tonne)	783.91	1331.36
Phosphorus 11-51-0, bulk ($/tonne)	1057.17	1367.57
Potassium 0-0-60, ($/tonne)	585	625
Diesel Fuel price (provincial allowance deducted) ($/l)	1.22	1.65
Seed price (wheat) ($/bu)	16.73	18.11
Seed price (canola) ($/bu)	14.65	15.56

Table 2. Crop price change in 2022 relative to expected prices.

Crop Price ($/bu)	Expected market price	Spring 2022 deferred price	October Spot Price
CPS Wheat	9.75	13.49	11.50
Argentine HT canola	16.40	24.17	19.30

4. According to what was reported in the 2022 Alberta crop budget.

Under the new actual values for these inputs, total direct expenses are up to 20% higher than the expected estimates. On the other hand, with the expected yield per acre remaining the same, both spring 2022 revenue under forward pricing and fall 2022 spot revenue for the selected crops are also higher than the expected revenue, as shown in Tables 3 and 4.

In order to determine whether net returns increased (or decreased) in 2022 under both higher expenses and higher revenue, we need to investigate the change in contribution margin. Table 3 indicates that farmers are likely to have a positive contribution margin even after the increase in input prices (fertilizer, fuel, and seed). The price increase for the selected crops more than offset input cost increases and result in positive contribution margins.

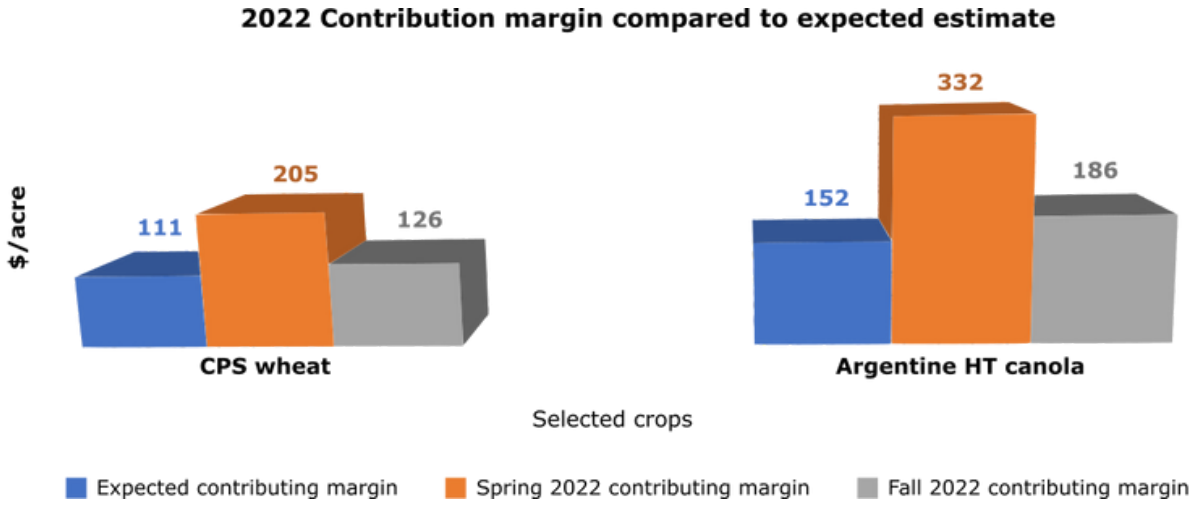
Most importantly, our analysis hinges on many assumptions around the change in input costs. It must be noted that other costs regarding pesticide expenses, labour, or machinery repairs have changed as well. Actual yield will could be different from the expected values and there will be differences due to growing region, cropping practices, and other additional factors.

Table 3. Contribution margins for CPS wheat in 2022 relative to predicted values for this year.

	Expected yield per acre (bu)	Expected revenue ($/acre)	Expected total direct expense	Expected contribution margin ($/acre)	Spring 2022 revenue if forward pricing	May 2022 total direct expense	Spring 2022 contribution margin ($/acre)	Fall 2022 spot revenue	Fall 2022 spot contribution margin ($/acre)
CPS Wheat	40	390	279	**111**	539	334	**205**	460	**126**

Table 4. Contribution margins for Argentine HT canola in 2022 relative to predicted values for this year.

	Expected yield per acre (bu)	Expected revenue ($/acre)	Expected total direct expense	Expected contribution margin ($/acre)	Spring 2022 revenue if forward pricing	May 2022 total direct expense	Spring 2022 contribution margin ($/acre)	Fall 2022 spot revenue	Fall 2022 spot contribution margin ($/acre)
Argentine HT canola	30	492	340	**152**	725	393	**332**	579	**186**



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Similarly, crop budgets contained in Ontario Publication 60 and the Ontario Farm Input Monitoring Surveys were used as a guide to obtain the values necessary to investigate how the jump in input prices and crop prices has affected the costs and returns, and ultimately the farmers' contribution margin. Corn and soybean are selected to estimate production costs and returns.

Based on the May 2022 Ontario Farm Input Monitoring Project Survey data, when compared to May 2021, fuel prices on average were up 62%, fertilizer prices were up 81% on average and pesticide prices were up 8%. Since the previous survey on October 2021, changes in average prices showed that the fuel products group was up 35% and the fertilizer prices were up 52%. Pesticide products as a group were up 3%. In June 2022, fertilizer prices were down 1% compared to May 2022, fuel products group was up slightly, and pesticide products as a group were similar. Table 5 provides detailed information on the price change for fertilizers, fuel, and seed cost.

Table 5. Ontario input price change in 2022 compared to October 2021.

	October 2021 Price	May 2022 Price
Nitrogen 46-0-0, Urea, bulk ($/tonne)	775	1361
Phosphorus 11-51-0, bulk ($/tonne)	1086	1367
Muriate of Potash ($/tonne)	674	1068
Diesel Fuel price (provincial allowance deducted) ($/l)	1.24	1.65
Seed price (wheat) ($/bu)	35.43	35.48
Seed price (Soybean conventional) ($/bu)	57.45	68.13

On the other hand, both spring 2022 deferred prices and October spot prices for the crops increased as well, compared to expected values reported in the crop budget for Ontario (Table 6).

Table 6. Crop price change in 2022 relative to expected prices.

Crop Price ($/bu)	Expected market price	Spring 2022 deferred price	October Spot Price
Grain corn	6.71	8.77	8.60
Soybean	15.80	18.60	18.50

Assuming the actual yield per acre remain and levels expected in budgets, with the increase experienced both in input and crop prices, both total variable expenses and actual revenue (spring 2022 revenue if forward pricing and fall 2022 spot revenue) are much higher than expected, as depicted in the graphs below.

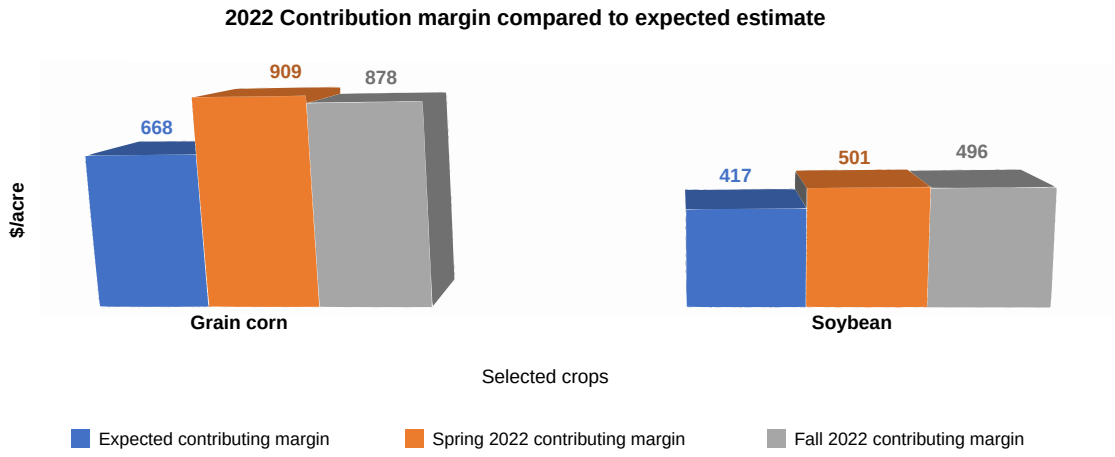
All the assumptions made for Alberta case remain for Ontario analysis as well. Our calculations indicate that high crop prices will result in a higher contribution margin than what was expected, similar to Alberta, even after the increase in input costs (Table 7 and 8). Corn growers seem to experience the greatest increase of the contribution margin, at over $230/acre more than anticipated.

Table 7. Contribution margins for grain corn in 2022 relative to expected values for this year.

	Expected yield per acre (bu)	Expected revenue ($/acre)	Expected total variables expenses	Expected contribution margin ($/acre)	Spring 2022 revenue if forward pricing	May 2022 total variable expense	Spring 2022 contribution margin ($/acre)	Fall 2022 spot revenue	Fall 2022 spot contribution margin ($/acre)
Grain Corn	174	1168	500	**668**	1527	618	**909**	1496	**878**

Table 8. Contribution margins for soybean in 2022 relative to expected values for this year.

	Expected yield per acre (bu)	Expected revenue ($/acre)	Expected total variable expense	Expected contribution margin ($/acre)	Spring 2022 revenue if forward pricing	May 2022 total variable expense	Spring 2022 contribution margin ($/acre)	Fall 2022 spot revenue	Fall 2022 spot contribution margin ($/acre)
Soybean	47	743	326	**417**	874	373	**501**	869	**496**



Observations

The results obtained here show the following. For the major crops representative of Western and Eastern Canada, based upon price increases, potential revenue per acre increased relative to pre-plant expectations. Moreover, relatively high forward crop prices were available to be locked in by producers throughout the spring planting period that farmers could have locked in. These declined somewhat through the growing season, but by the fall harvest and immediately after, prices had strengthened again. This same trend was observed in the east and west. Similarly, compared with the expectations of crop variable costs evident in crop budgets, by spring planting expenses had significantly increased, especially for fertilizer.

What is clear from the results is that, relative to the pre-plant expectations contained in budgets, the increase in crop revenues (based upon price increases) dominated the increase in input costs, such that contribution margins in 2022 exceeded expectations. With this acknowledged, it remains the case that input costs were extremely high for 2022 (perhaps a record), a source of financial stress and potential concern going forward, further discussed below.

Conclusions

Based on the results observed here, given the returns from key indicator crops, it would appear that the input cost surge experience of 2022 was not a threat to farm contribution margins. Indeed, 2022 saw strong producer production margins in major grain and oilseed crops, both east and west. However, some caution is warranted in interpreting this result. First, there were intervening factors that pushed up farm commodity prices in addition to the sharp increase in fertilizer prices, most obviously the stranding of significant grain inventories in Ukraine following the invasion which impacted global prices. The international response to the invasion and evolution of events has also exacerbated input cost inflation. In any event, it was not predetermined that the increase in global crop prices would exceed the increase in input prices; the reverse could have occurred.

Moreover, the analysis here focuses on the crop segment; livestock feeding segments experience crop prices as expenses, and may also experience inflation in input costs if they produce a portion of their own feed. For these farms it is less likely that the 2022 increase in input and crop prices has had positive economic effects. Because there are lags in adjustment between higher feed costs and livestock prices, the livestock feeding segments are likely to have been negatively impacted.

This paper has focused on the earnings (or contribution margin) effects of farm input and crop price inflation; another aspect of input price inflation is financial. When fertilizer prices increase suddenly spike and/or come into short supply, procurement by farmers entails greater needs for cash working capital. In 2022, much higher cash production costs had to be carried forward before the realization of the revenue to settle payables at harvest. Ultimately the returns were strong, but the prospect of some farms facing constraints on spring working capital means that some could have run out of cash to cover escalating expenses before cash became available at harvest. Conversely, high crop prices are accompanied with the prospect of increased volatility. Mitigating price risk- through futures hedging, forward purchasing, etc. consumes cash and draws upon working capital. The implication is that even if crop producers will have ended up with a strong 2022 in terms of earnings, it may have entailed different forms of financial arrangements, financing costs, and indeed financial stress.

Another aspect is yields; the analysis here has assumed expected yields and the situation facing producers with reduced yields will be different. Input costs are incurred largely on an acre-basis, but crop revenues are based on bushels or tonnes sold. The implication is that for producers that had lower than expected yields, there is no assurance that their actual returns exceeded the increase in costs in a year with spiking input prices. AgriInsurance is a great instrument of relief in this case, as under a floating price option the increase in crop prices will be reflected in the indemnity payment for crop loss. However, a difficulty arises from the combination of increased input costs, reduced yields, and low or decreasing crop prices. There is no element of value in AgriInsurance related to sunk costs of production that provides relief under this situation; cushioning of the lost earnings fall back on AgriStability, which by design will have the effect of pro-rating payments relative to AgriInsurance.

Canadian agricultural policy has adjusted to some of the risks evident in 2022. In particular, important changes were announced earlier this year that expand access to cash working capital under the Advanced Payments Program (APP)[5]. Under APP, yield guarantees under AgriInsurance can be leveraged as cash advances and thereby improve working capital access. This is a very positive development, fit for purpose with the current time. Governments also have an opportunity to buttress AgriInsurance and AgriStability with programs that address the gap scenario in which input costs increase, prices received by Canadian farmers fall, and there is a yield shortfall. This is consistent with ongoing concerns of industry regarding AgriStability. It is also consistent with a form of revenue coverage that works in tandem with a margin-based program.

In 2022, broadly speaking, the economics of increasing costs and increasing crop prices worked out for Canadian crop producers.However, we should not assume that this will always be the case. With few exceptions, Canada is a price taker and Canadian market conditions are unlikely to materially influence global markets. Moreover, our existing program sets reflect the legacy of the decades following World War II and the primary concern addressed in agricultural policy that advances in the supply of farm products through improved technology and productivity would overwhelm growth in demand- resulting in chronically low farm prices, low and unstable farm incomes, and underinvestment in agriculture. In short order, that reality appears to have changed. The greater concern today is of sufficiency of supply, slower growth in agricultural productivity, scarce energy and volatile energy prices, and growing global food demand and food security concerns. The conflict in Ukraine and associated trade disruptions is revealing a food security gap that may not be transitional pending the end of the war; it was developing prior to the war.

We must thus assume that the situation that developed in 2022 is apt to occur again and that it may not work out next time as well as it apparently has in 2022, and develop agricultural policy accordingly.

5. For an overview and brief discussion of changes, see https://ofa.on.ca/notable-changes-to-the-advanced-payment-program-app-regarding-interest-rates/

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