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Market Impact: Agricultural Commodities Post Russia-Ukraine War

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Background

- The Russo-Ukrainian War started with Russia's annexation of Crimea in February 2014, it expanded to Ukraine's Donbas region in April 2014, and escalated with Russia's invasion on February 24, 2022, the largest attack on Europe since WWII.
- Ukraine's agricultural output and export capabilities have been severely impacted by the conflict, while sanctions on Russia have complicated export logistics.
- We suggest that there was a discontinuity in the wheat commodity market the day Russia invaded Ukraine.
- This research aims to quantify this discontinuity.

Literature Review

- Goyal and Steinbach(2023) showed an increase in agricultural commodity prices of 16% on average above the historical averages during the same time within the first 9 weeks of the invasion.
- In a recent study, Meng and Yu (2023) use a regression discontinuity design to show that gasoline prices in countries with a dependency on crude oil are susceptible to the Russia-Ukraine conflict
- Obi et al. (2023) found that in commodity markets, cumulative abnormal returns were largely positive before and after the invasion of Ukraine

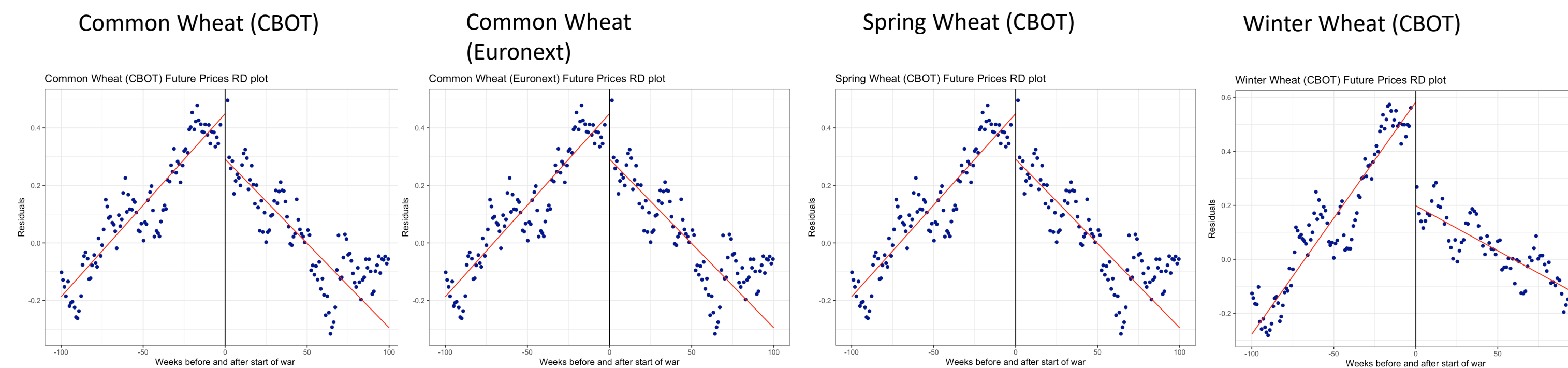
Objectives

- We want to employ a regression discontinuity design to to quantify a market discontinuity in the agricultural commodity market due to a geopolitical event.
- Demonstrate that there was a discontinuity in wheat prices on the day Russia invaded Ukraine.
- Provide an understanding of geopolitical events effect in different market settings.

Data

- We use weekly future prices, exports and stock. We extracted the data from the Bloomberg terminal.
- Specifically for wheat, we sourced data from two separate exchanges: Chicago Board of Trade (CBOT)Euronext (Paris wheat contracts).
- For our Stock Variable we used data from CBOT weekly stock of total wheat deliverable.
- We use Wheat grain export inspection data for our export variable.
- For our volatility variable ewe use the VIX index

Regression Discontinuity plots



Results

First Regression Results						
Dependent Variable:	Price					
Observations:	841					
	Vix	Stocks	Exports	War	F- stat	df
European common Wheat	0.001 (0.019)	-0.212*** (0.017)	0.070*** (0.019)	0.381*** (0.025)	74.495	6;834
CBOT common Wheat	0.002 (0.019)	-0.213*** (0.017)	0.070*** (0.019)	0.381*** (0.025)	74.495	6;834
CBOT Winter Wheat	-0.041 (0.022)	-0.197*** (0.019)	0.063** (0.021)	0.600*** (0.027)	108.300	6,834
CBOT Spring Wheat	0.001 (0.019)	-0.212*** (0.017)	0.070*** (0.019)	0.381*** (0.025)	74.495	6;834

Regression Discontinuity Results						
	Method	Coef	Std. Err.	Z	P> z	[95% C.I.]
European common Wheat	Conventional	0.33	0.041	8.106	0.000	[0.250, 0.409]
	Robust	-	-	6.129	0.000	[0.281, 0.545]
CBOT common Wheat	Conventional	0.288	0.034	8.524	0.000	[0.222, 0.354]
	Robust	-	-	6.307	0.000	[0.286, 0.545]
CBOT Winter Wheat	Conventional	-0.365	0.025	-14.708	0.000	[-0.414, -0.316]
	Robust	-	-	-5.448	0.000	[-0.350, -0.165]
CBOT Spring Wheat	Conventional	-0.104	0.34	-3.079	0.002	[-0.170, -0.038]
	Robust	-	-	0.246	0.806	[-0.156, 0.200]

- The first step regression results imply that the war had a statistically significant effect in the two markets we observed and, the three types of wheats we did the analysis on.
- We can also observe that the results of the regression discontinuity show a significant market disruption that occurred on the day Russia invaded Ukraine, affecting two markets and three types of wheat analyzed.

Methodological Approach

- To analyze the discontinuity caused by the invasion on agricultural commodity markets, we follow the paradigm of Meng & Yu (2023):

$$Price_{ct} = \beta_0 + \beta_1 D(t \geq War_{ct}) + \beta_2 f(t - War_{ct}) + \beta_3 D(t \geq War_{ct}) \times f(t - War_{ct}) + \beta_4 X_{ct} + \gamma_t + \varepsilon_t$$

- Where:
 - $Price_{ct}$ is the price of the agricultural commodity c at time t
 - $D(t \geq War_{ct})$ is an indicator variable. It takes the value of 1 after the outbreak of the conflict and 0 before
 - $t - War_{ct}$ represents the number of weeks when the conflict occur
 - $f(t - War_{ct})$ controls for the differences before and after the Russia- Ukraine conflict.
 - X_{ct} denotes control variables of demand, supply and volatility
 - γ_t represents time fixed effects and controls for seasonality
 - ε_t is the error term
- RD analysis offers a finer-grained assessment of local average treatments effects.

Conclusion

- We found that the Russia Ukraine conflict caused future prices to rise with a discontinuity around the war.
- Our findings indicate that the European commodity exchange market was significantly more impacted by the conflict, experiencing a 39% price increase when the invasion began. In comparison, the Chicago Board of Trade market saw a slightly lower price increase of 33%.
- We also found that Winter wheat contracts had a price jump of 37% while Spring wheat had lower price jump of 10%.

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