



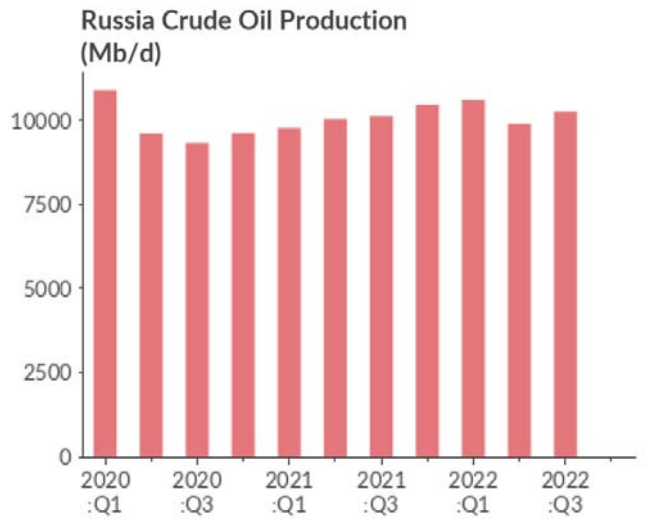
Fuel and Fertilizer Update: What to expect in 2023

Gregg Ibendahl - K-State

2023-01-18

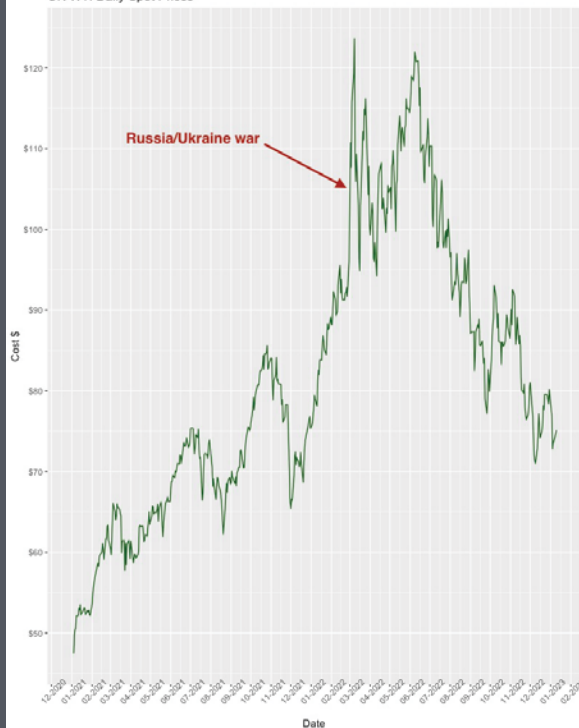


Little change in production



- Oil is a fungible commodity
 - Difficult to make tariffs work
- Selling more to India and other countries
- EU price caps unlikely to be very effective
 - Russia faces world market price

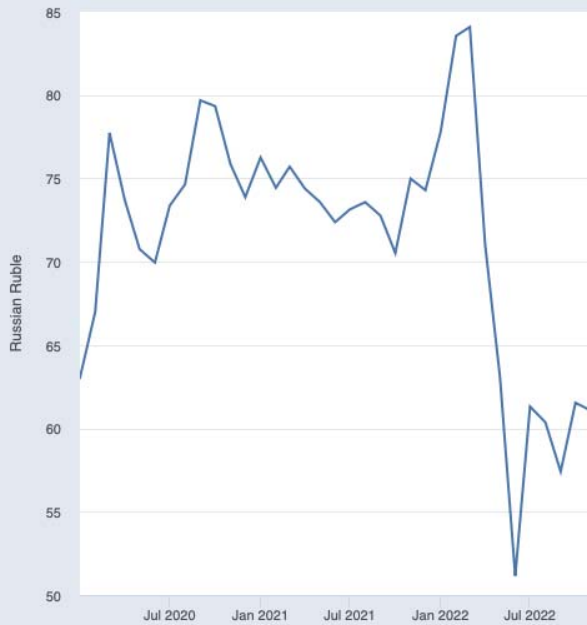
OK WTI Daily Spot Prices



Oil prices are lower than pre-war

- Initial start of war put oil at \$120
- Prices backed off but then heated up in spring of '22
- Since last June, prices have declined
- Is this too low?
 - Have traders figured in an appropriate risk premium?
- Assumes Russia oil production remains stable

FRED — National Currency to US Dollar Spot Exchange Rate for the Russian Federation



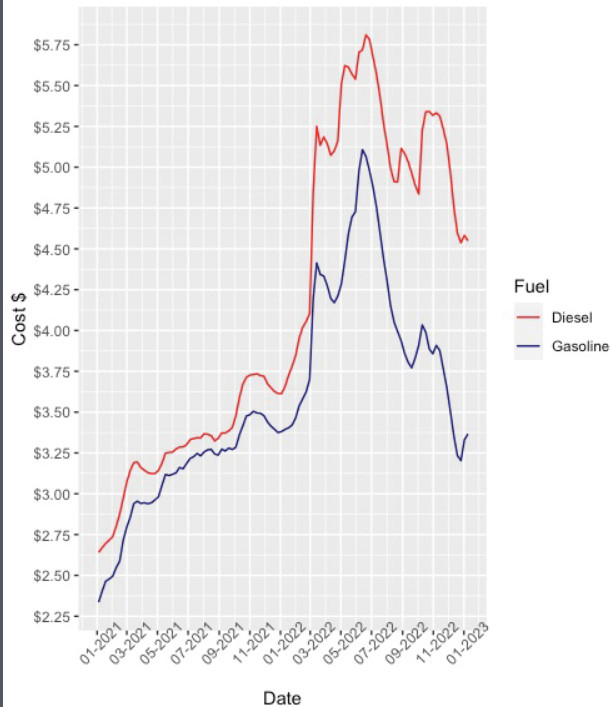
Source: Organization for Economic Co-operation and Development

Russia's economy

- War initially strengthened Ruble
- Ruble has weakened since last summer
- Lower world oil prices hurting oil exporting nations
- Interest rates at 7.5%
 - down from the 20% last March
- Inflation estimated to be 12.5%
- Lower world demand for oil has likely hurt Russia more than sanctions and tariffs

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Highway Fuel Prices

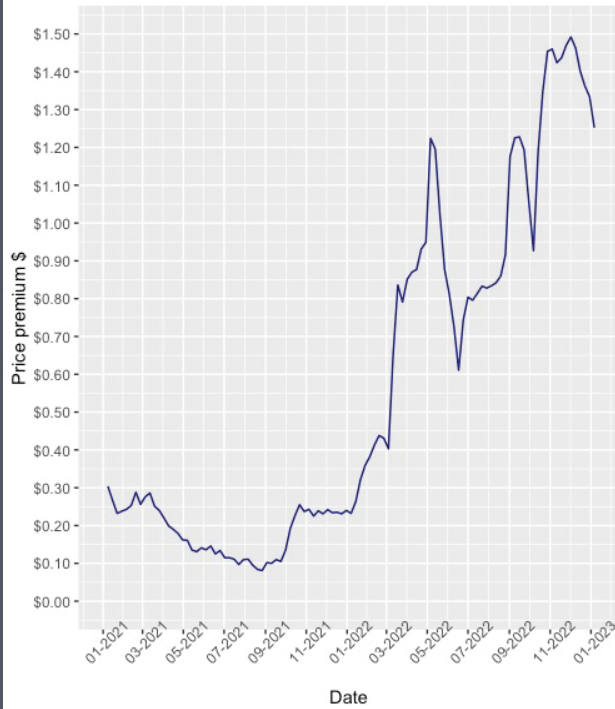


Gas and Diesel prices

- Fuel prices have declined along with oil prices
 - not as much as expected
- the price spread between gas and diesel has gotten larger
- Did \$5 gas fix \$5 gas?

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Diesel to Gas Premium

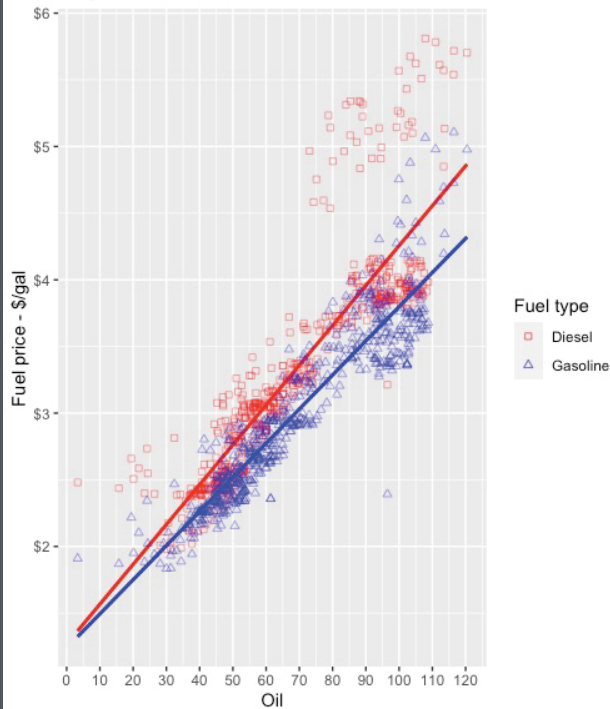


Diesel premium

- The diesel premium reached record levels this fall
- Still very high
- Why haven't refineries made more diesel
 - Refineries have some latitude to adjust their fuel mix
 - Both gas and diesel are in short supply
 - Lack of refinery capacity

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Regression of Fuel vs Oil

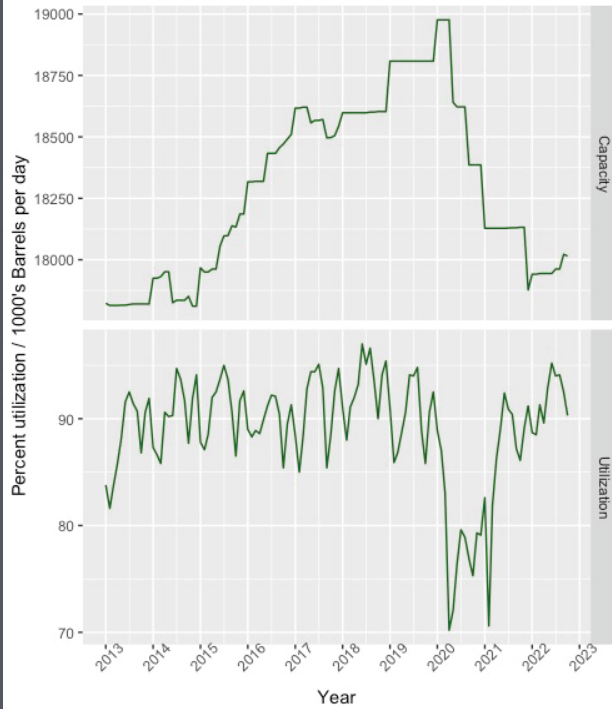


Where fuel prices should be

- \$75 dollar oil
 - \$3.20 gas
 - \$3.50 diesel
 - Gas isn't far off but diesel is
- Are the regression curves now different?
 - without more refinery capacity - Yes

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Refinery Capacity and Utilization

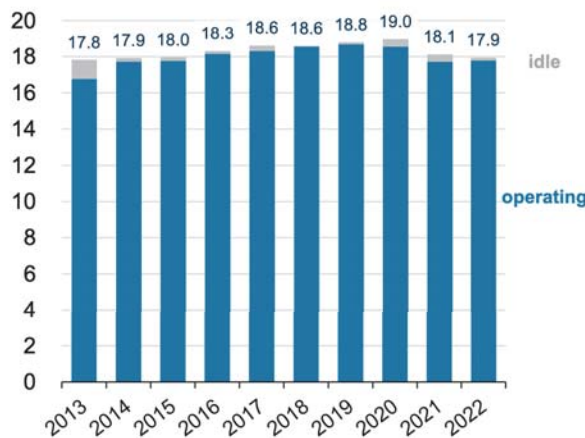


Refinery capacity and utilization

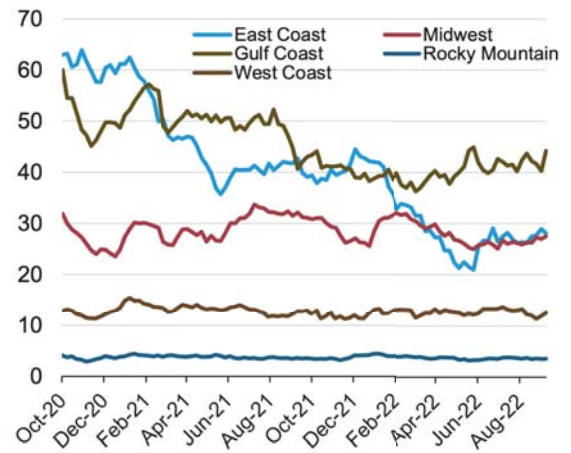
- U.S. lost capacity during Covid
 - shutdown of old plants
 - refinery fire
- It's doubtful we will ever match pre-Covid production
 - last new refinery built in the 1970s
 - environmental hoops
 - the drive to electric vehicles
- Utilization is already very high and difficult to improve
- Is there a push to generate more gasoline at the expense of diesel?
 - some refinery capacity to adjust mix of fuels

U.S. refining capacity has fallen over the past two years, contributing to lower than normal inventories in some regions

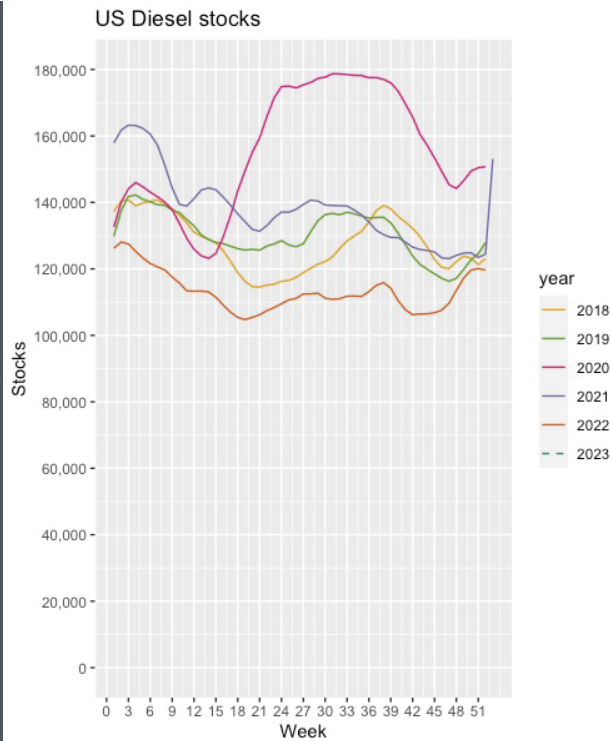
U.S. atmospheric crude oil distillation capacity
million barrels per calendar day as of January 1



Regional distillate stocks
million barrels



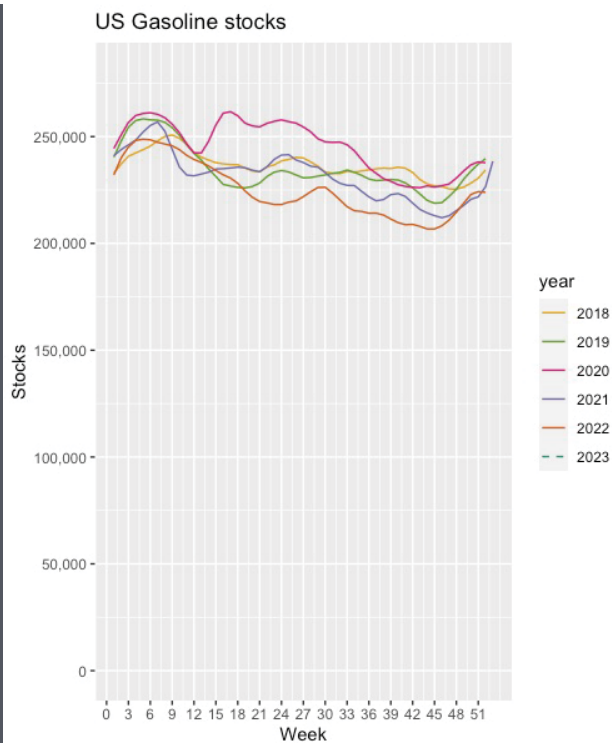
Source: U.S. Energy Information Administration, Refinery Capacity Report



Very low diesel stocks

- Diesel inventories were well below normal the entire year last year
- Inventory situation will take a long time to correct
- It might correct quicker if we enter a recession

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Gasoline stocks are low too

- not as bad as diesel
- part of the reason we haven't seen refineries shift more production to diesel

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Monthly U.S. retail fuel prices (Jan 2018–Dec 2024)

dollars per gallon



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EIA Oil price predictions

West Texas Intermediate (WTI) crude oil price and NYMEX confidence intervals

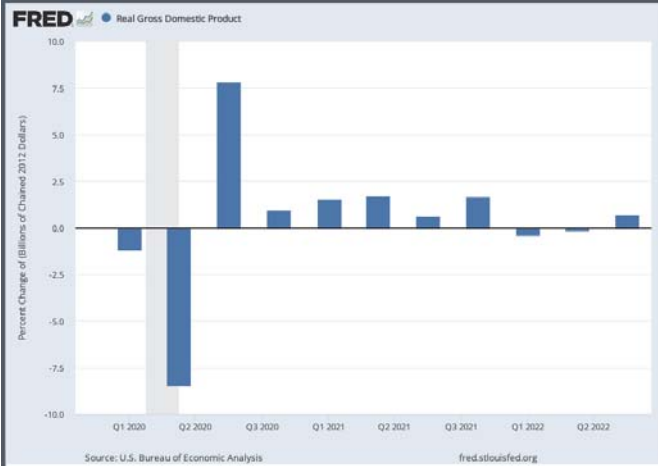


Data source: U.S. Energy Information Administration, Short-Term Energy Outlook, November 2022, CME Group, Bloomberg, L.P., and Refinitiv an LSEG Business
 Note: Confidence interval derived from options market information for the five trading days ending November 3, 2022. Intervals not calculated for months with sparse trading in near-the-money options contracts.

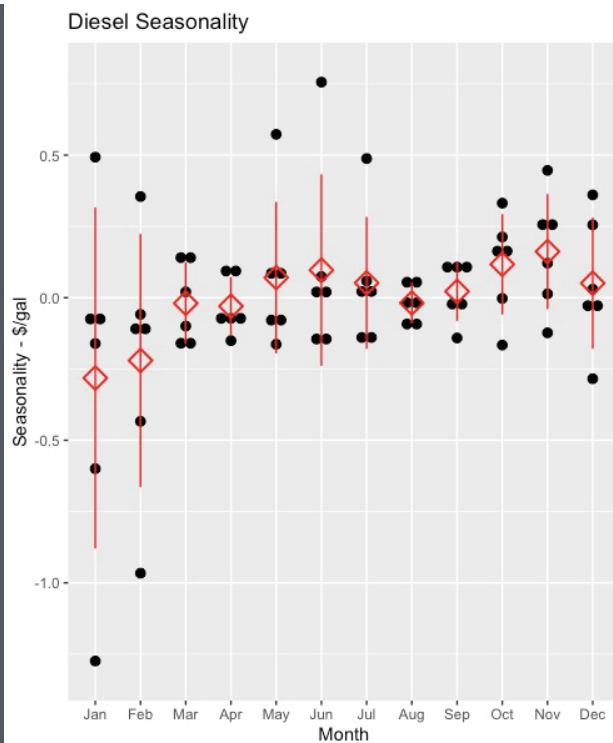


- Steady oil prices over the next year
- Some divergence of EIA and futures markets
- Extremely wide confidence interval
- \$35 to \$185
- What will happen in Russia and Ukraine?

Prices are affected by GDP (or vice versa)

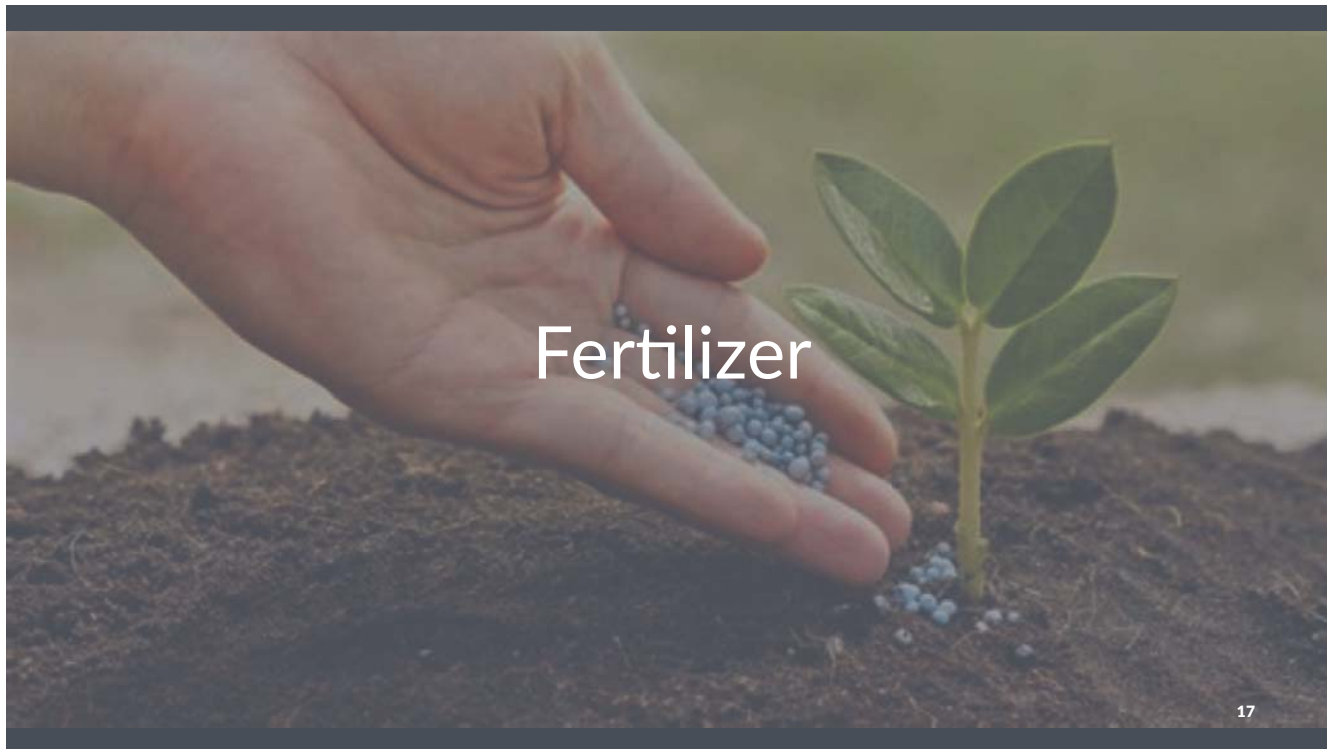


- Covid in early 2020 brought economy to a standstill
- Oil futures prices went into negative territory on 4/20/22 for one day
- Economy started to recover in late 2020 and into 2021
- Slowdown in 2020
 - Was \$5 gas a cause?



What can farmers do?

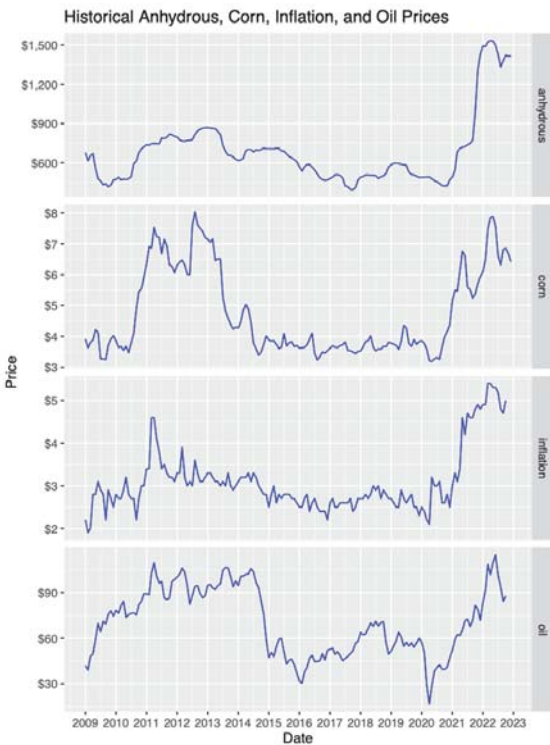
- There is a definite seasonality pattern to diesel fuel prices
- Prices are highest in May/June and also October/November
- Prices are cheapest in January and February and also August
- Storage of fuel for a few months is beneficial



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Russia is a major player in fertilizer

- Russia is one of the leading exporters as well
- Russia is the #3 producer of ammonia (N) in the world
 - fortunately any country with natural gas can make N
 - Haber-Bosch process
- Russia is the #2 producer of potash (K)
 - 20% of world production
 - U.S. imports nearly all of its P
- Russia is the #4 producer of phosphate rock (P)
 - 6% of world production
 - U.S. is the #3 producer

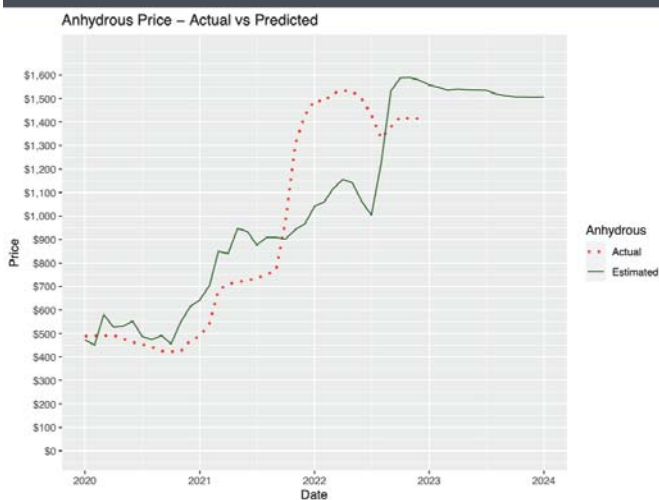


Model to predict prices

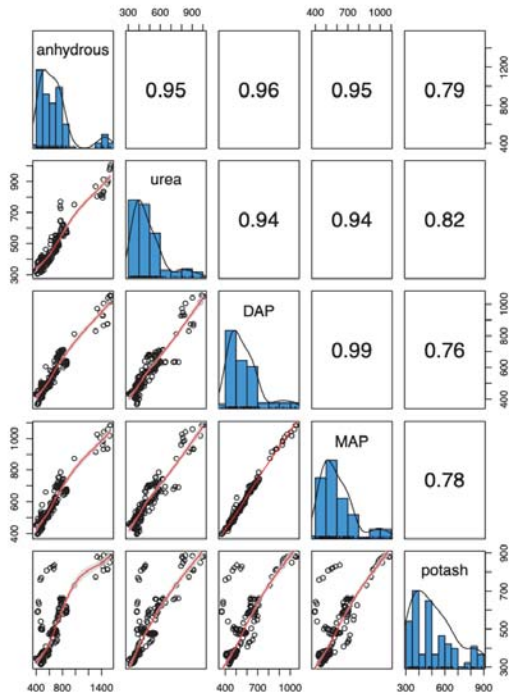
- Added inflation expectations to the model in fall of 2021
- Latest model
 - Anhydrous ammonia (\$/ton) =
 - -140
 - + 64.1 * corn (\$/bu)
 - + 1.55 * oil_6 mo lg (\$/barrel)
 - + 126 * inflation expectations

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Anhydrous prices



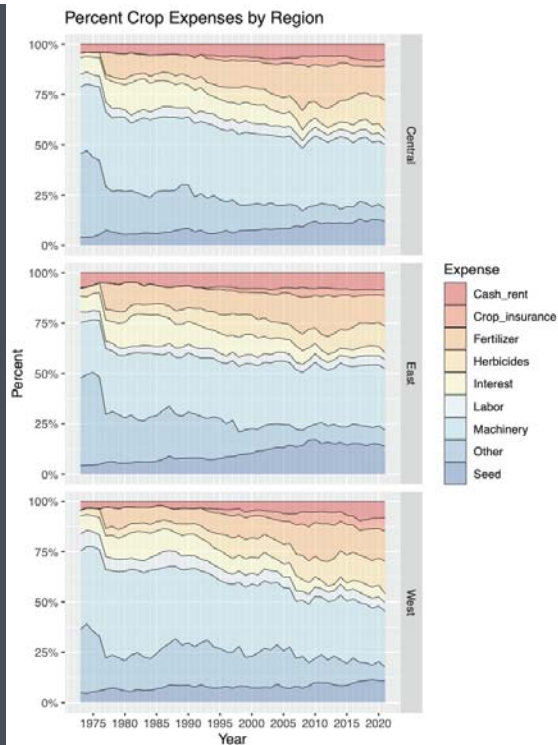
- With assumptions, my predicted prices may be too high
 - Prices slowly drifting down
- Still a lot of upside price risk
 - Russia/Ukraine war is still a big unknown
 - Will a recession occur?
 - Other factors - EU removing farmland



Fertilizer prices are highly correlated

- Anhydrous prices are strongly correlated to other fertilizer prices
- Ammonia is starting point with other nitrogen products
- Potash has a 0.79 correlation
- Potash (K) is the big question mark
 - US depends almost entirely on imports
 - Production 480 K MT
 - Imports 7,000 K MT
 - Exports 100 K MT
 - Consumption 7,400 K MT
- Most imports (75%) come from Canada

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Comparison of Major Crop Expenses by Area
Percent of Total Expenses - 1978 and 2020

	Year	Machinery	Fertilizer	Seed	Labor	Herbicide	Interest	Cash rent	Crop insurance
Central									
	1978	36.5%	11.8%	6.8%	4.9%	2.4%	13.2%	4.4%	0.0%
	2021	31.7%	17.0%	12.2%	3.1%	15.4%	3.5%	7.5%	3.3%
East									
	1978	30.2%	13.3%	6.2%	3.8%	5.7%	10.6%	5.4%	0.0%
	2021	30.6%	15.0%	13.7%	4.5%	13.2%	3.4%	8.1%	3.4%
West									
	1978	41.8%	9.2%	7.3%	6.2%	4.4%	11.5%	3.2%	0.0%
	2021	27.8%	14.7%	10.8%	4.2%	16.2%	4.5%	8.3%	6.6%

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Questions?

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