



PURPOSE

BACKGROUND

- Nitrogen fertilizer is one of the primary nutrient inputs required for crop production.
- Nitrogen fertilizer is also one of the major input expenses impacting a producer's bottom line, so price variances can dramatically impact their profitability of a producer's operation.
- Canada acts as both an importer and exporter in the trade market depending on the region

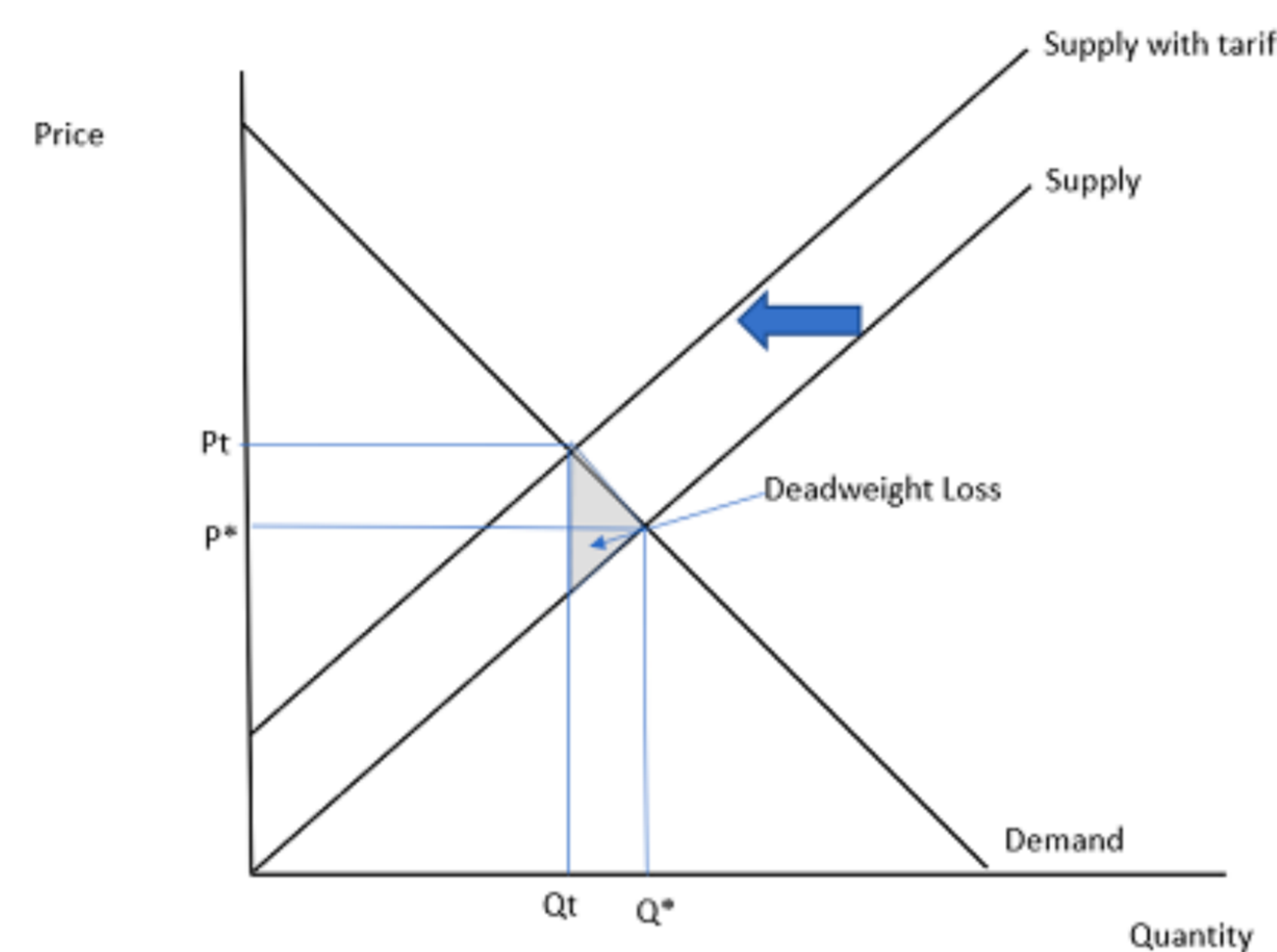
PROBLEM

- The Russian war in Ukraine has caused the federal government of Canada to impose a 35% import tariff on all goods imported from Russia and Belarus.
- An annual 660,000- 680,000 nutrient tonnes of nitrogen fertilizer imported into Canada from either Russia or Belarus are now subject to a 35% price increase.

METHODS

- Through the use of a partial equilibrium one commodity model understand the relationships between crop production and the demanded amount of nitrogen required.
- Once the equilibrium of nitrogen is found, the impact of import tariffs will shock the partial equilibrium model to find our new equilibrium price.

Figure 1. Supply Shift Caused by the Introduction of an Import Tariff



DATA

- The quarterly data relating to the import, export, and production of the various forms of Nitrogen fertilizer is sourced from Statistics Canada.
- Crop Production data including acreage per crop and crop price was supplied from Statistics Canada.
- Nitrogen fertilizer price data was captured by the Canadian Farm Input Price Index, Federal Reserve Economic Data, the UK's Office for National Statistics.
- Endogenous Variables captured within the model include: nitrogen fertilizer import, nitrogen fertilizer exports, nitrogen fertilizer produced within Canada, nitrogen fertilizer demand for the various crops, the total quantity of nitrogen fertilizer demanded, and the price of a nutrient tonne equivalent of nitrogen fertilizer.

MODEL SPECIFICATION

- The Quantity of Nitrogen supplied to the Canadian market was captured using the quantities of ammonia (NH₃), Urea, Urea Ammonium Nitrate, and Ammonium Nitrate produced within Canada and imported into the Canadian market, less the applicable exports of nitrogen fertilizers to the US. Standardized to nutrient units.
- Total nitrogen fertilizer demand requirements were established by the fertilizer demand for the following crops and their respective prices: spring wheat, winter wheat, barley, corn for grain, corn for silage, canola, grass hay, oats, flax, nitrogen fixing crops, and other field crops.
- Nitrogen demand per crop was sorted from taking the acreage of the crop on an annual basis, and applying assumed values for nitrogen uptake requirements of a particular crop and the timing of application.

MODEL RESULTS

REGRESSION RESULTS

- Notable results were the significance captured by the following variables: the US nitrogen fertilizer price index, the import nitrogen fertilizer price index, the previous year's Canadian nitrogen price index value, the price of natural gas, and the CAD/USD exchange rate (Figure 2).

Figure 2. Canadian Nitrogen Fertilizer Price Index Regression

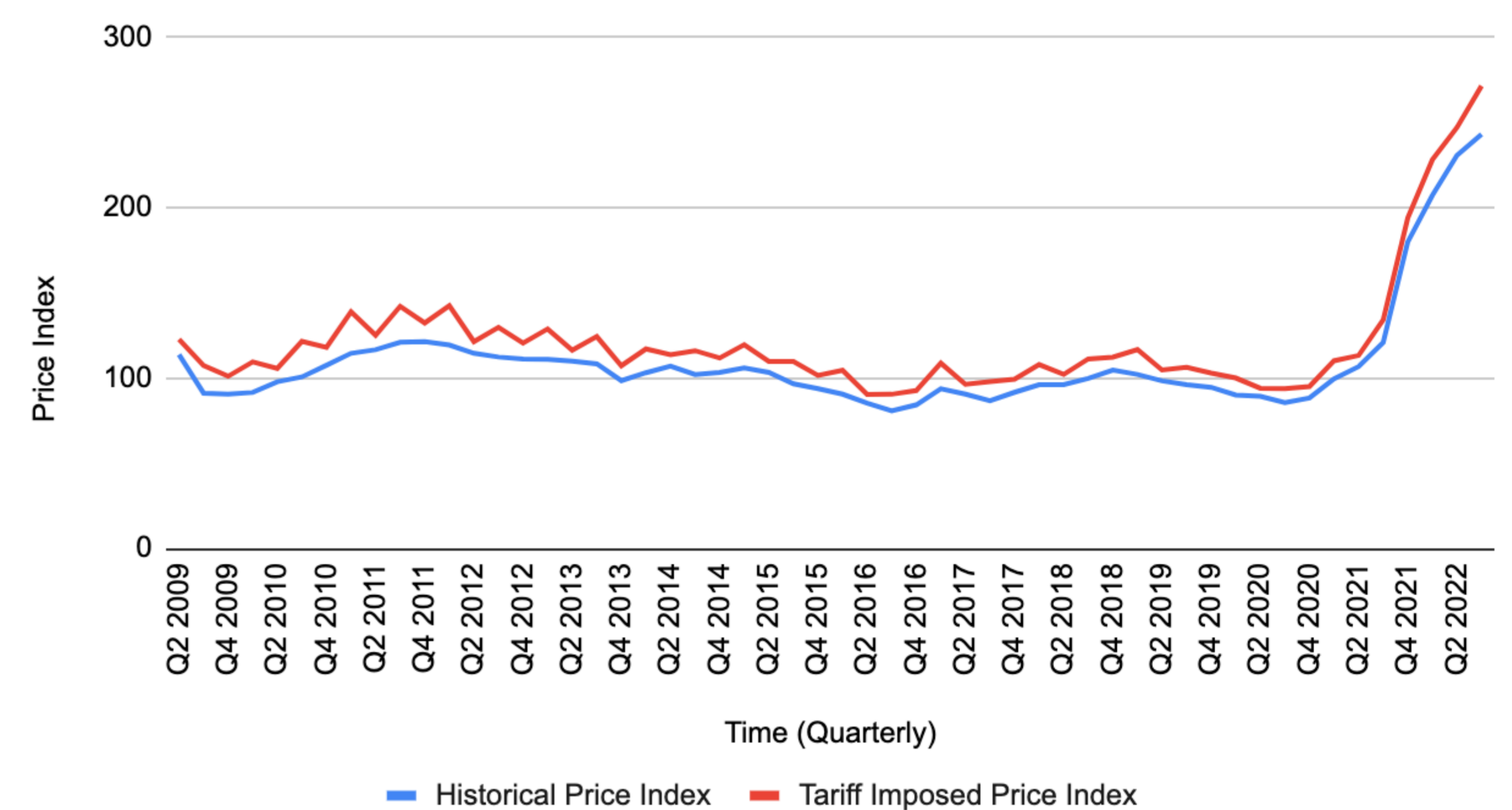
Variable	Coefficient	Standard Error	t-value	p-value	
(Intercept)	1.85E+02	9.22E+02	0.201	0.8419	
US_N_Price	2.58E-01	5.14E-02	5.029	1.02E-05	***
N_Import_Price	4.10E-01	7.52E-02	5.448	2.63E-06	***
lag(Canada_N_Price)	1.68E-01	7.63E-02	2.207	0.03293	*
Nat_Gas_Price	-1.90E-01	5.99E-02	-3.165	0.00292	**
Exchange_Rate	-2.61E+01	1.37E+01	-1.907	0.06359	~
Q_Demanded	2.80E-06	2.69E-05	0.104	0.91748	
Q_Supply	-7.63E-06	8.67E-06	-0.88	0.38378	
Q_Import	1.29E-05	1.56E-05	0.824	0.41471	
Q_Export	-1.29E-05	1.09E-05	-1.189	0.24129	
Q1	5.92E+00	1.17E+01	0.506	0.61557	
Q2	-3.15E+00	4.25E+01	-0.074	0.9413	
Q3	-3.31E-01	7.58E+00	-0.044	0.96544	
Time	-7.38E-02	4.59E-01	-0.161	0.87302	
Signif. Codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '~'	

There is a strong relationship between the Canadian Price of Nitrogen nutritional unit and the related regression variables as the Canadian Nitrogen Fertilizer Price Index Regression observed a multiple R-squared value of 0.9516 and an adjusted R-squared of 0.9362.

SIMULATION RESULTS

- Using a static shock method we observed the impact to the import price index of fertilizer by the implementation of the 35% tariff on Russian and Belarusian goods from a period beginning in the first quarter of 2009 until the third quarter of 2022 (Figure 3).
- With the tariff import implications in effect there was an increase in price variance observed.
- Using a standardized expected import amount incoming from Russia. and Belarus, the increase in import pricing can be observed.
- Price volatility has increased given the assumed amount of imports incoming was held constant and the remaining imports from the rest of the world handled the discrepancy of outstanding imports and not had the tariff imposed.

Implications of a Tariff on the Import Nitrogen Price Index



CONCLUSION & IMPLICATIONS

- The imposed tariffs on fertilizer imports have increased the Canadian price for fertilizer, added volatility and uncertainty to the price, and the impending impact on the bottom line of producers across the country.
- Further analysis into the trade flows of fertilizer within the country could potentially benefit producers, bottom lines, and prices at grocery stores.

