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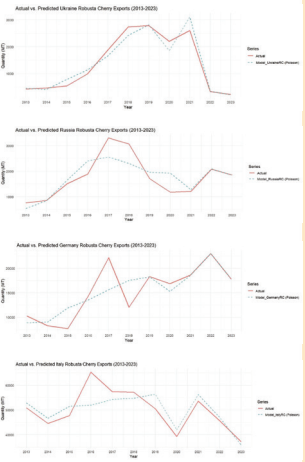
Bitter-Sweet Geopolitical Stir in the Indian Coffee Export: Focus on Russia-Ukraine War

Vilas Jadhav[1] Mrinal Sharma[2] and Akshata Nayak[3]



Introduction

The post-Covid period has witnessed many global changes and conflicts. The effects of Covid were just beginning to fade when the world observed a geopolitical threat escalate into an actual geopolitical act, the Russia-Ukraine War. A geopolitical threat is when there is evidence of war risk, peace threats, military buildups, sanctions, and embargoes, whereas a geopolitical act refers to the actual act of war and terrorist acts (Caldara, Dario and Matteo Iacoviello (2022), Measuring Geopolitical Risk). The geopolitical risk continues to intensify via trade agreement conflicts and other recent wars between India-Pakistan and Iran-Israel. The rising insecurities between nations, the advocacy of protectionist policies by the US, and the rising interest in reducing dependence on resources between different countries all increase the turbulence of geopolitical risk and conflict.

In the event of such volatility, it becomes inevitable for the Indian government to understand the geopolitical risk to the agriculture trade, as more than 46.1 per cent (Economic Survey, 2025) of the economy is employed in this sector, and agriculture exports constitute 11.90 per cent of the total export value of India (Coffee Board of India, 2025). This situation serves as an opportunity for India to dig deeper and further expand its international relations and trade ties to spread any future risk associated with geopolitical conflicts based on the gains India can achieve with expected future trade with different countries. The study has been pursued with the objective to understand the impact of the Russia-Ukraine war on coffee exports. The results of the study will serve as a basis for further exploration of the impact of the Russia-Ukraine war, the Israel-Iran war, and the India-Pakistan war (2025) on the agricultural trade of other products. Also, the findings of coffee exports hope to provide policy recommendations for strategising and navigating through such uncertain times.

Scenario of coffee exports

The recent news greatly celebrated the coffee export reaching $1.8 billion and a surge of 125 per cent in export value in the past decade. Among all the wins, there is a constant looming shadow of the fluctuating prices due to supply shocks and the rising impact of demand shocks due to geopolitical tensions globally. While the value of coffee exports has increased over the years, it is important to take note of the quantities exported during wartime and the impact of it to better prepare for future uncertainties. India contributes 3.41 per cent to the world's coffee production. Hence, it is a price taker and has no control over the prevailing global prices, making it vulnerable to price fluctuations due to supply shocks. India's major coffee export destinations are Italy, Germany, the Russian Federation, Ukraine, Belgium, and Turkey. Over the years, India has gained and lost coffee trade partners. Russia and Ukraine, two export destinations, were directly involved in the war, whereas Italy and Germany, the top two export destinations, were indirectly involved in the war by virtue of standing in solidarity with Ukraine. While India takes a neutral stance on the Russia-Ukraine war, it still feels the impact on trade directly and indirectly. Wars have never been positive and have often resulted in human and economic loss. As Copeland D.C, in his paper mentions, states should rather trade than invade, but insecurities over resources often erupt and overtake the benefits of peace and trade. Hence, understanding the impact of geopolitical risk is not only important for industries and investors but also very important for a nation to assess the impact of threats and acts on different agricultural commodity trades individually. Especially for India, as agriculture stands to be the backbone of the country.

The overall objective of the study is, given the increased geopolitical tensions in the world, it is important to assess the repercussion of the increased volatility and uncertainty on India's international trade of agricultural products in general and coffee in particular. The purpose is to capture the effect of the Russia-Ukraine war on Indian coffee exports of green Robusta cherry beans, which account for 48 per cent of the total Indian coffee exports in 2022-23 and 43 per cent in 2023-24. The study focuses on coffee exports to Russia and Ukraine, the war countries, and the top two importing countries, namely Italy and Germany. The study estimates methodologically the overall impact on the coffee trade due to rising geopolitical threats and acts to strengthen the resilience of India towards similar future volatility and uncertainty in the world.

[1 & 3] Assistant Professors, Agricultural Development and Rural Transformation Centre, Institute for Social and Economic Change (ISEC), Bengaluru, Karnataka, India

[2] Research scholar, Agricultural Development and Rural Transformation Centre, Institute for Social and Economic Change (ISEC), Bengaluru, Karnataka, India

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Data and methodology

The present study aims to examine the effect of the Russia and Ukraine war on Indian coffee exports at a macro-level analysis, and the required data on a number of variables, like coffee robusta cherry, real GDP per capita of the destination country in year t, real GDP per capita of India in year t, and the domestic price of robusta coffee, were collected from different sources like Coffee Board publications, India Stat.com, etc. The analysis is based on the annual time series data pertaining to 2013-14 to 2023-24, with a focus on exports to Russia, Ukraine, Italy, and Germany. Russia and Ukraine were purposively selected as they were directly involved in war, and Italy and Germany were selected as they are the top importers of coffee from India, which contributed to 26 per cent of coffee in 2021-22 (before the war period). The collected data was dissected using a special application of the Generalised Linear Model (Poisson Pseudo Maximum Likelihood (PPML model)) by using R Studio software. The details of the Poisson Pseudo Maximum Likelihood model are as follows.

Poisson Pseudo Maximum Likelihood (PPML) Model

The Poisson Pseudo Maximum Likelihood (PPML) model, which is a specific application of the Generalised Linear Model, was used to estimate the effect on the quantity of coffee exported to each country individually. This model is commonly applied in international trade analysis, particularly in the context of the gravity model. It is especially useful when the dataset has a small number of observations and there is limited information about the presence of heteroscedasticity. To detect and eliminate multicollinearity among the explanatory variables, the Variance Inflation Factor (VIF) was calculated.

Table 1: Impact of Russia-Ukraine war on Total Indian Coffee Exports on Selected countries (Quantity in MT)

Country	Total Quantity Exported		Impact of War (% Change)	GDP Growth Rate (%)	
	Before (2013 -2021)	After (2022-2023)		Before (2013 -2021)	After (2022-2023)
Italy	73127.00	58179.50	-20.44	0.34	2.75
Russia	23319.00	30768.50	31.94	1.19	1.35
Germany	32429.00	39682.00	22.37	1.22	0.55
Ukraine	6093.00	3150.50	**-48.29**	-0.59	-11.75
Total	**134968.00**	**131780.50**	**-2.36**	**2.16**	**-7.10**

Source: Authors' estimations using coffee board data.

The following equation was designed:

$$E(\text{QuantityMT}_{it}) = (\beta 0 + \beta 1.\text{GDPPC}_{jt} + \beta 2 \cdot \text{GDPPC}_{it} + \beta 3 \cdot \text{Domestic Prices} + \beta 4 \cdot \text{`WarDummy}_t)$$

Were

$E(\text{QuantityMT}_{it})$ = Expected Quantity of Export in Metric Tonnes of Robusta Cherry Green beans to the Destination Country

$\beta 0$ = Intercept

GDPPC_{jt} = Real GDP Per Capita of the Destination Country in year t

GDPPC_{it} = Real GDP Per Capita of India (Origin) in year t

Domestic Price = Robusta Cherry Prices at ICTA Bangalore

WarDummy_t = War dummy variable (1 if war is present in year t, else 0)

Results and discussion

Impact of Russia-Ukraine war

The impact of the Russia-Ukraine war on Indian coffee exports to Russia, Ukraine, Italy, and Germany is presented in Table 1. It is clear from Table 1 that before the Russia-Ukraine war, the average total quantity of coffee exports to the four countries (i.e., from 2013 to 2021) was 134968 MT, and after the Russia-Ukraine war (2022 to 2025), the quantity of coffee exports to these four countries declined to 131780.50 MT, reflecting a decrease of -2.36 per cent change over the 2021-22 to 2024-25 period. As the war started in 2022, Ukraine's economy was severely impacted, with an average GDP growth rate of (-0.59%) in 2022 and 2023 (post-war) being -11.75 per cent. Indian coffee exports to Ukraine fell by -48.29 per cent post 2021. Whereas Italy, one of the largest importers of Indian coffees, also witnessed a decline in imports from India, amounting to -20.44 per cent in the postwar period.

Interestingly, the fall was reduced by increased export demand by Russia and Germany. Russia and Germany both have seen a positive increase in imports of Indian coffee, amounting to a 31.94 per cent and 22.37 per cent increase post-war (Table 1). Further analysis is required with 2024 and 2025 coffee export data to measure the lagged effect on the two countries. But nonetheless, war is war, and hence the total average export to four countries declined by -2.36 per cent from 2013-21 to 2022-23 (Table 1). The total Indian coffee exports to all trading countries have fallen from 398,699 MT in 2022 to 376,029 MT in 2023. The decline in total exports to all trading countries requires an extended inquiry as well.

Results of Poisson Pseudo Maximum L ikelihood model

The impact of the Russia-Ukraine war and price rise on the total export of robusta cherry green beans is presented in tables 2 to 3 and figures 1 to 4. Table 2 represents the coefficients from the presented PPML model, where the dependent variable is the coffee export of Robusta Cherry and real GDP per Capita of India, real GDP per capita of the importing country and the Indian domestic price of coffee are independent variables. For Germany, Italy, and Ukraine, all coefficients of independent variables are highly significant at the one per cent level. Whereas for Russia, except for the coefficient of Indian domestic prices, rest of the coefficients are significant at the one per cent level.

As per the model, the coefficient of the war dummy was negative for Italy, which implies that, war reduces the imports by 17.43 per cent (Table 3). Whereas, for Germany, the coffee exports have had a positive impact, with war increasing the imports by 39.15 per cent (Table 3). The opposite impact of war could be due to Germany stockpiling in the year 2022, given the fears of war disruption. Both European countries were impacted by the war as they stood in solidarity with Ukraine. Due to war, the energy supply from Russia was hindered to the European countries, causing inflation and price rises. This created problems for Germany and Italy's economy. Italy's demand for Indian Robusta coffee was already declining at a CAGR of -5.47 per cent; war further aggravated the fall, and the quantity exported in 2023 was 37,237 MT, a 42.94 per cent drop from 2013. Germany's demand for Robusta Cherry green beans fell by 23 per cent in 2023 to 17,802 MT from 23,007 MT in 2022. The war coefficient was unable to capture the fall in 2023 and was overpowered by the increase in demand in 2022 (Tables -2 & 3 and Figure 3).

Both Italy and Germany have a negative correlation with Indian domestic coffee prices, which is in line with the theoretical relationship of demand and prices of a commodity. This indicates, for one unit change in domestic prices, quantity changes by 0.48 per cent and 0.68 per cent, respectively, keeping all other variables constant (Table 3). The coefficient of the importing country's real GDP per capita is positive for both Italy and Germany, indicating an increase in real GDP per capita directly increases the demand for Indian coffees. In the

case of Italy, there is a peculiar result regarding the coefficient of the exporting country's real GDP per capita (India), reflecting a negative correlation between exports to Italy and India's real GDP per capita. This could be, as per capita real GDP of India rises; the domestic demand for Indian coffees also increases, which in turn could push the prices up and hence make Indian coffee more expensive for Italy.

Table 2: Results of poisson pseudo maximum likelihood model

Variables	Germany	Italy	Ukraine	Russia
Intercept	6.811041 (0.3304) ***	7.745780 (0.0798) ***	1.486771 (0.2402) ***	17.136075 (0.4070) ***
GDPPC_j (importing Country)	0.000033 (0.0000096) ***	0.000130 (0.0000031) ***	0.000678 (0.000157) ***	-0.001602 (0.000056) ***
GDPPC_i (India)	0.001291 (0.000059) ***	-0.000229 (0.0000147) ***	0.003921 (0.000093) ***	0.003231 (0.000095) ***
Domestic Price	-0.006819 (0.000216) ***	-0.004023 (0.000130) ***	-0.019790 (0.001832) ***	0.000148 (0.000699)
War Dummy	0.330450 (0.0164) ***	-0.191534 (0.0118) ***	-1.457265 (0.1801) ***	-0.190151 (0.0547) ***
Adj. Pseudo R^2	0.6521	0.6343	0.9513	0.7041

Source: Authors' estimations using Coffee Board data.

Note: ***,**,* indicates 1,5 and 10 per cent level of Significance: (***p < 2.2e-16.) War dummy % effect: Calculated as ((e ^ {coefficient}) - 1) \times 100%).

Among the war countries, Ukraine's pseudo-R^2 is .9513 (Table 2), indicating a good fit of the model. The model explains 95 per cent of the variations in coffee exports to Ukraine. Ukraine does not import large quantities from India, but it helps us understand the risk a geopolitical act holds. The coefficient of the war dummy for Ukraine is -1.4527 (table 2 & figure 1), implying a negative 76.71 per cent impact on Indian coffee exports to Ukraine (table 3). In the case of Russia, the model fit is also strong with a pseudo-R^2 of 0.7041 (Table 2 and Figure 2). The coefficient of the war dummy for Russia is -0.190151; the impact was less for Robusta Cherry Green beans as compared to Ukraine's, but nonetheless, it was negative. In the case of Russia, it is important to shed light on its instant coffee imports (excluded in the model), as it is one of the top importers of instant coffee from India. Russia, too, like Germany, stockpiled instant coffee in the year 2022 and then reduced the imports of instant coffee by -19.80 per cent in 2023 from 2022. Overall, the impact of war on total Russian imports (all varieties of coffee) could have been positive given the Indian and Russian ties, but it may have been dampened due to war and high prices.

As said before, war is war, and the impact can be observed in the reduction of total Robusta Cherry bean exports to four countries, which fell from 76,041 MT in 2021 to 57,118 MT in 2023 (-24.8 per cent reduction). The overall export to all trading partners of Robusta Cherry Green Beans fell to 157,237 MT in 2023 from 190,413 MT in 2022.

The model predicts the fall in quantity exported during war time very closely to the actual fall as it is visible from the above graphs (Figure 1 to 4). Hence, the model can be useful for prediction of Indian coffee exports during war times.

Pattern of coffee consumption

Robusta Cherry and instant coffee together account for more than 70 per cent of the Indian coffee exports. A detailed inquiry into Robusta Cherry green beans and instant coffee exports revealed two interesting coffee consumption patterns, as follows.

Demand stability for instant coffee

It was observed that demand for instant coffee for war countries was more stable as compared to demand for Robusta Cherry green beans (not roasted). Also, the total export quantity of instant coffee (quantity exported to all trading partners) increased from 2022 to 2023 by 6 per cent, whereas the demand for Robusta cherry green beans fell by 17 per cent during the same period. This demonstrates more stability for value-added products even during war time.

GDP per capita and product preference

Another striking finding of the study emerges when closely looking into Robusta Cherry green beans and instant coffee exports: the top 6 countries that import instant coffee from India have a GDP per capita between 2,000 and 15,000 USD, apart from the USA, and the top 6 countries that import Robusta Cherry green beans have a real GDP per capita between 18,000 USD and 43,000 USD, apart from Libya. This finding invokes partially the Linder's international trade theory, where countries having similar real GDP per capita have similar product preferences and consumption patterns. This highlights how the GDP per capita of a country can help us in recognising the country's demand for a specific product, particularly coffee. In this context, the above revelations need further in-depth research and focused study for better empirical results.

Conclusion

The current uncertainty serves as an opportunity for India to present itself as a true world leader, advocating peace and international trade. It is with the creation of the expectation of future trade that India can show a more peaceful and interdependent path of global growth. To quote from Copeland's paper on Expectation theory, "*Interdependence operates like the reins on the dark horse of inner passions; it provides a material incentive to stay at peace, even when there is an internal predisposition towards aggression. Remove the reins, however, and these passions are free to roam as they will.*"

Table 3: Impact of Russia-Ukraine war on trade Effect

Variables	Germany		Italy		Ukraine		Russia	
	(β)	Trade Effect$	(β)	Trade Effect$	(β)	Trade Effect$	(β)	Trade Effect$
Partner GDPPC	0.00003	0.00***	0.00013	0.01***	0.000678	0.07***	-0.0016	-0.16***
Own GDPPC	0.00129	0.13***	-0.00023	-0.02***	0.003921	0.39***	0.003231	0.32***
Domestic Price	-0.00682	-0.68***	-0.00402	-0.40***	-0.01979	-1.96***	0.000148	NS
War Effect	0.33045	39.15***	-0.19153	-17.43***	-1.45727	-76.71***	-0.19015	-17.29***

Source: Authors' estimations using Coffee Board data;

Note : *** indicates high significance [p < 0.001]: NS- Not significant, $-(per centage Change): (β)- Coefficient (β).

Figure 1: Actual vs Predicted Exports to Ukraine of Robusta Cherry Green Beans

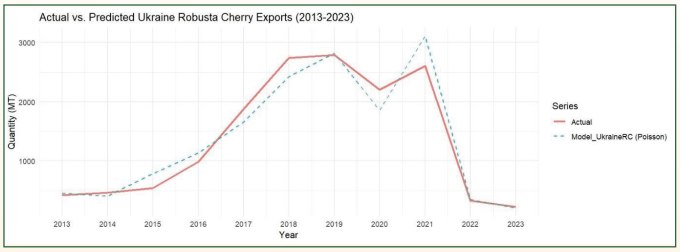


Figure 2: Actual vs Predicted Exports to Russia of Robusta Cherry Green Beans

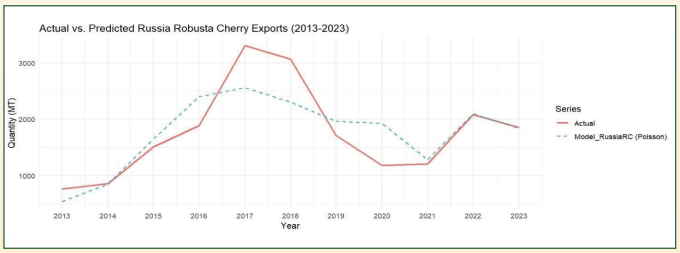


Figure 3: Actual vs Predicted Exports to Germany of Robusta Cherry Green Beans

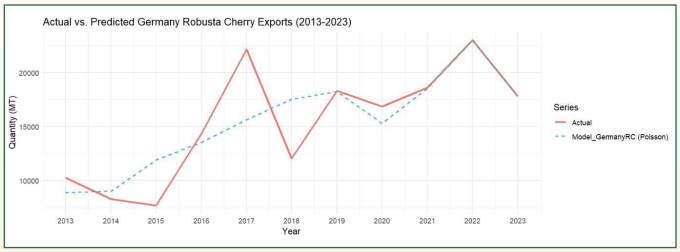
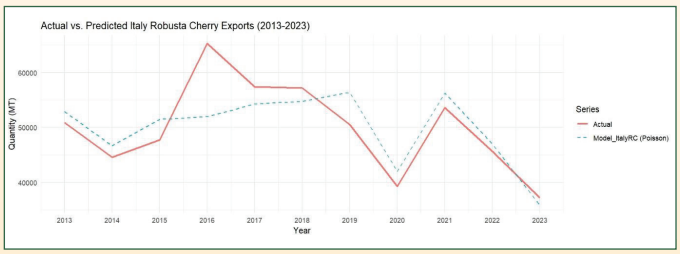


Figure 4 : Actual vs Predicted Exports to Italy of Robusta Cherry Green Beans



Policy recommendation

1. Wait and Watch or Play and Watch: Taking notes from the Coffee export, India needs to pre-emptively calculate using a similar model and predict the risks and gains from the ongoing rising geopolitical conflicts in different parts of the world on the agriculture export sector and prepare and strategise accordingly.
2. The impact can linger on for more than a year, causing considerable damage to the export sector. It is the need of the hour for the government to explore trade opportunities with more countries to spread and minimise the risk. Plus, the expectation of trade plays a positive role in reducing conflicts, as per Dale C. Copeland, Economic Interdependence and War: A Theory of Trade Expectations.
3. Raw Material Export to Value-Added Product: India should strategically set more value-added industry in the agriculture sector, as it helps to be resilient to global market fluctuation and capture a larger part of the export share.
4. Indian manufacturers of value-added agriculture products should be helped with subsidies and schemes (through the Ministry of Micro, Small & Medium Enterprises (MSME)) to push them on the path of becoming globally more competitive.
5. Another Take on Linder's Trade Theory: Target marketing as per country's GDP per capita. India should market its wide variety of agriculture and value-added products as per similar country preference. Whilst Italy and Germany are saturated markets now, India should explore export destinations with product diversification in mind.
6. List of potential countries from Export Competitiveness of Indian Coffee: Analysing Trade Potential in the Global Market, suggests the UK, Netherlands, and France still have potential for coffee trade opportunities to be explored by India; all have an average GDP per capita higher than $30,000; hence, speciality and green bean coffee can be well marketed to such countries.
7. Additionally, Bangladesh and China, which also have unexhausted export potential, have GDPs ranging from $2000 to $12,000. In these countries, instant coffee can be marketed for better results.

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Institute for Social and Economic Change
Dr. V K R V Rao Road, Nagarabhavi PO, Bangalore 560072
Phone: 23215468, 23215519, Fax: +91-80-23217008; Web: http://www.isec.ac.in