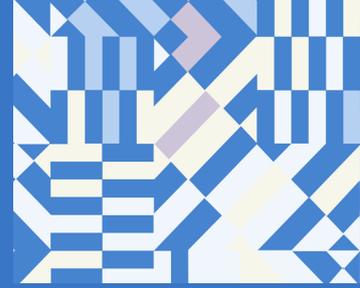




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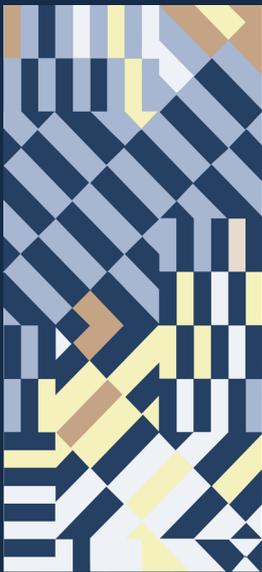
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## Global Fertilizer Trade and Market Disruptions: Impacts on Agricultural Productivity, Growth and Food Security for Rwanda

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### 1. Introduction

Rwanda is expected to be significantly affected by the sharp increases in global fertilizer prices. With an import penetration rate close to 100 percent, Rwanda essentially imports fertilizer to satisfy its domestic needs. The country is highly exposed to the reduction of exports from the conflicting countries and the resulting global fertilizer price increase. Moreover, approximately 13 percent of Rwanda's fertilizer imports originated from Russia and Ukraine over the decade of 2011-2020. Supply shortages and higher prices reduce fertilizer application rates, which lower productivity, leading to decreased crop outputs. Declines in individual crop outputs lower the agricultural sector's contribution to the overall economy and depress gross domestic product growth (GDP). The current report presents results from simulations of this chain of events for Rwanda.

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## 2. Global Fertilizer Price Shocks Under the Russia-Ukraine Crisis

The disruptions in the global fertilizer trade and markets induced by the Russian war on Ukraine can significantly impact agricultural productivity, growth, and food security. Table 1 shows the projections for 2022-2024 of fertilizer prices in October 2021, i.e., few months before the Ukraine war broke out (referred to as the “Baseline scenario” hereon) and in October 2022, i.e., after the start of the war (referred to as the “Ukraine scenario” hereon). The sharp differences between the baseline scenario and the Ukraine scenario illustrate the effects of the Ukraine war on global fertilizer markets. Under the baseline scenario, global fertilizer prices are projected to stabilize in 2022 (except for potassium) before trending downwards in 2023 and 2024. Following the start of the war, the downward trend in prices of all fertilizer types reversed course, rising between 31 and 148 percent. Phosphate prices are projected to more than double. Potassium prices increase sharply from the already high levels projected under the baseline scenario which shows the post-COVID-19 situation. The modest declines projected for 2023 and 2024 under the Ukraine scenario suggest that prices will barely recover from the surge in 2022 and will therefore remain at high levels into 2024. Thus, Rwanda is expected to face substantial increases in fertilizer prices in the near future.

**Table 1: Percentage Annual Changes of Fertilizer Prices**

Type	October 2021 Forecasts			October 2022 Forecasts		
	2022	2023	2024	2022	2023	2024
DAP	-0,2	-25.0	-11.1	31.4	-5.1	-13.3
Phosphate rock	5,7	-15.4	-9.1	119.5	-25.9	-12.5
Potassium chloride	54,8	-15.4	0.7	147.6	-3.8	-4.2
TSP	-3,3	-23.1	-10.0	36.6	-11.6	-15.4
Urea, E. Europe	-22,4	-20.0	-8.3	49.1	-9.7	-7.7

**Source:** World Bank, Commodity Markets Outlook (2021 and 2022)

## 3. Agricultural Productivity and Growth Effects

Fertilizer use tends to be concentrated among few crops, i.e., pulses, maize, and potatoes (Table 2). These crops contribute to more than 40 percent of the agricultural sector output. Moreover, fertilizer use is high among other crops, including the vegetable sector. Hence, the disruption of global fertilizer supply chains and the ensuing sharp price increases is expected to have heterogenous effects within the agricultural sector.

**Table 2: Percentage Shares of Fertiliser Use and Value-Added by Type of Crop in Rwanda**

Crop type	Share Total Fertilizer	Share Agricultural Value Added
Wheat	2.2	1.2
Maize	10.4	8.8
Paddy rice	5.1	2.5
Sorghum	2.6	4.6
Irish potatoes	6.2	9.2
Sweet potatoes	4.3	8.3
Cassava	3.5	7.4
Other roots	0.5	0.8
Pulses	13.4	14.2
Other crops	51.9	32.0

Source: 2018 SAM for Rwanda

Rwanda is projected to show a decline in fertilizer use for all crops under the Ukraine scenario compared to the baseline scenario (Table 3). Fertilizer use is expected to decline further in 2023 and 2024 as global fertilizer prices remain solidly above pre-war levels into 2024 and negative agricultural output and income shocks in 2022. Assuming unchanged Government policies, fertilizer use is projected to decline between 28 and 32 percent in 2022, 31 and 36 percent in 2023, and 30 and 34 percent in 2024.

**Table 3: Fertilizer Use by Type of Crop, Percentage Changes Ukraine Compared to Baseline Scenarios**

Crop type	2022	2023	2024
Wheat	-32.3	-35.8	-33.7
Maize	-29.5	-32.3	-32.0
Paddy rice	-30.8	-34.0	-32.4
Sorghum	-29.8	-32.9	-32.8
Irish potatoes	-28.3	-30.9	-30.0
Sweet potatoes	-28.7	-31.5	-31.1
Cassava	-28.6	-31.2	-30.4
Other roots	-28.7	-31.5	-31.2
Pulses	-28.1	-30.7	-30.3
Other crops	-31.6	-35.3	-33.5

Source: Simulation Results (2022)

The significantly higher fertilizer prices and lower application rates across all crop types will translate into lower output and the decline of the agricultural sector's value added in Rwanda. The decline in crop productivity and output under the Ukraine scenario, compared to the baseline scenario, will drive the decline of the overall sector productivity and output (Tables 4 and 5). The decline in crop activities which contribute to 89 percent of agricultural value-added in Rwanda, drives the slowdown of agricultural growth. Agricultural value-added will decline by nearly 5 percent in Rwanda. As shown in Table 5, the drop in agricultural output persists and sharpens in 2023 and 2024, i.e., 6.0 and 6.3

percent, respectively. The analysis further shows that lower output for the agricultural sector reduces economywide GDP by 2.1 percent in 2022. The rate of GDP decline in 2023 and 2024 exceeds the initial drop in 2022, reflecting the lingering economywide effects of the global fertilizer supply chain disruptions.

**Table 4: Fertilizer Consumption and Agricultural Productivity, and Growth, Percentage Changes Ukraine Compared to Baseline Scenarios**

	2022	2023	2024
Fertilizer Use	-30.4	-33.6	-32.4
Crop Productivity	-3.5	-3.9	-3.8
Agriculture Productivity	-3.3	-3.7	-3.5
Value Added, Crops	-5.5	-6.4	-6.5
Value Added, Agriculture	-5.0	-6.0	-6.3
Gross Domestic Product	-2.1	-3.8	-6.1

Source: Simulation Results (2022)

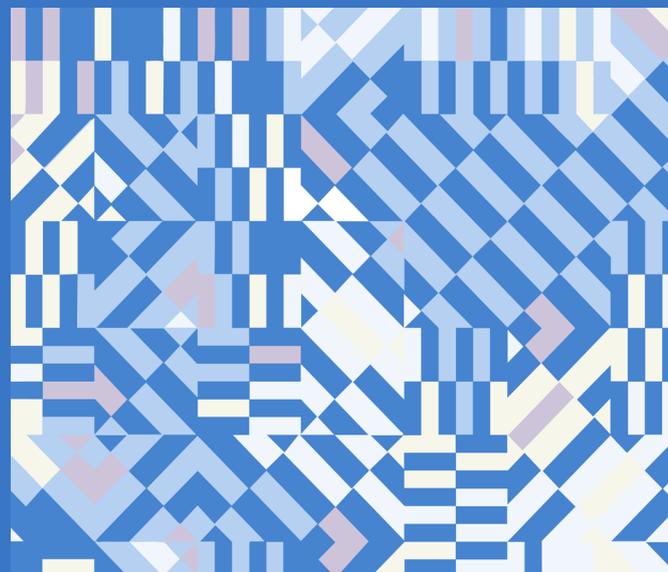
**4. Conclusion**

Global fertilizer price increases are projected to adversely affect Rwanda’s agricultural sector and economy over 2022-2024. Global fertilizer prices rose between 31 and 148 percent between 2021 and 2022 after the start of the war. High fertilizer prices are expected to stay into 2024. Fertilizer supply shock and higher prices are projected to reduce fertilizer use by 28-36 percent annually over 2022-2024. Consequently, growth of the agricultural sector and the national economy are projected to slow by 5 and 2 percent, respectively, in 2022. Growth decline accelerates in 2023 and 2024, reflecting the lingering economywide effects of the global fertilizer supply chain disruptions. Thus, Government response to the global fertilizer trade and market disruptions is crucial to mitigate the severe economic impact and related food security implications in Rwanda.

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