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UGANDA

Systematic Analysis of World Market and Domestic Production Shocks

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This study is part of a series of country briefs by IFPRI that leverages economywide models to deliver detailed risk assessments of key economic indicators. This initial analysis evaluates vulnerabilities across economic sectors and key population groups to answer two questions: (1) How vulnerable are national economy and population of Uganda to world market and domestic production shocks? (2) What are the largest risks to Uganda's overall economic performance, private consumption, and reductions in poverty and undernourishment?

Overview

Achieving development goals is subject to economic uncertainties, yet policymaking rarely accounts for these risks. This Country Brief quantifies the risks facing Uganda's economy and population, focusing on two primary sources:

1) **External risks** stemming from shocks in international commodity prices and foreign capital flows and
2) **Domestic risks** associated with production shocks in volatile sectors of the Uganda economy, such as primary agriculture and hydropower electricity generation, are often caused by extreme weather.

The significance of these risks is assessed based on the range of the shocks' impacts on four main economic and development indicators: total GDP, private consumption, poverty rate, and prevalence of undernourishment.

The analysis uses data mining methods to simultaneously sample many shocks from historical data, constructing a comprehensive set of realistic shock scenarios for Uganda. A country-specific, economywide Computable General Equilibrium (CGE) model then simulates the impacts of these shocks on both total and sector-specific economic outcomes, deriving changes in poverty and undernourishment for each

shock scenario. Finally, machine learning techniques are applied to obtain metrics for the relative importance of different risk factors.

The results suggest that domestic production volatility is the primary risk factor affecting GDP and poverty in Uganda, whereas world markets and domestic risks are equally important for household consumption and undernourishment. Individually, the most critical risk factors identified include production volatility in root crops, volatility in foreign capital flows, and volatility in fishery production, with the latter being particularly significant for rural low-income households.

Understanding these economic risks is a critical first step in facilitating discussions on potential risk management strategies, such as promoting domestic productivity growth and diversifying economic activity away from high-risk sectors.

1. Background and Objectives

An examination of the historical dynamics of Uganda's key economic indicators helps identify key factors influencing the country's development (Figure 1). Economic growth in the country resumed following the end of the Ugandan Bush War in 1986, and since 1987, GDP per capita has steadily increased, albeit at varying rates (Figure 1A). In the 1990s, Uganda implemented Structural Adjustment Programs supported by the IMF and World Bank, liberalizing trade, privatizing state-owned enterprises, and attracting foreign investment. In the 2000s, the government prioritized large-scale infrastructure projects, including road networks and energy expansion, financed through external capital (reflected in a substantially higher current account deficit, Figure 1B). Efforts to diversify the agrarian economy included investment in industrial sectors, particularly cement, steel, and agroprocessing, leading to a rise in the prominence of non-agricultural sectors (Figure 1C). However, agricultural productivity has not kept pace with population growth (Figure 1D). While cash crops like coffee and tea have shown improvement, food crop productivity remains low. Periodic external shocks, such as world market turbulence in 2008 and 2011 (Figure 1E), occasionally propagate through Uganda's import-dependent economy, resulting in the highest inflation spikes since the 1990s (Figure 1F).

Governments in Uganda and around the world rely on economic projections to inform policy decisions and achieve development goals. However, the accuracy of projected trends and, even more so, the occurrence of economic shocks are naturally uncertain. Recent economic crises such as the global COVID-19 recession and global food and market disruptions due to Russia's invasion of Ukraine are stark reminders of the unpredictability of future events and the severity of these crises' impacts on the national economies and populations of many countries highlighted the unpreparedness of their governments. Major impacts in developing countries included setbacks in poverty and hunger reduction, jeopardizing the achievement of the first two Sustainable Development Goals of UN Member States by 2030.

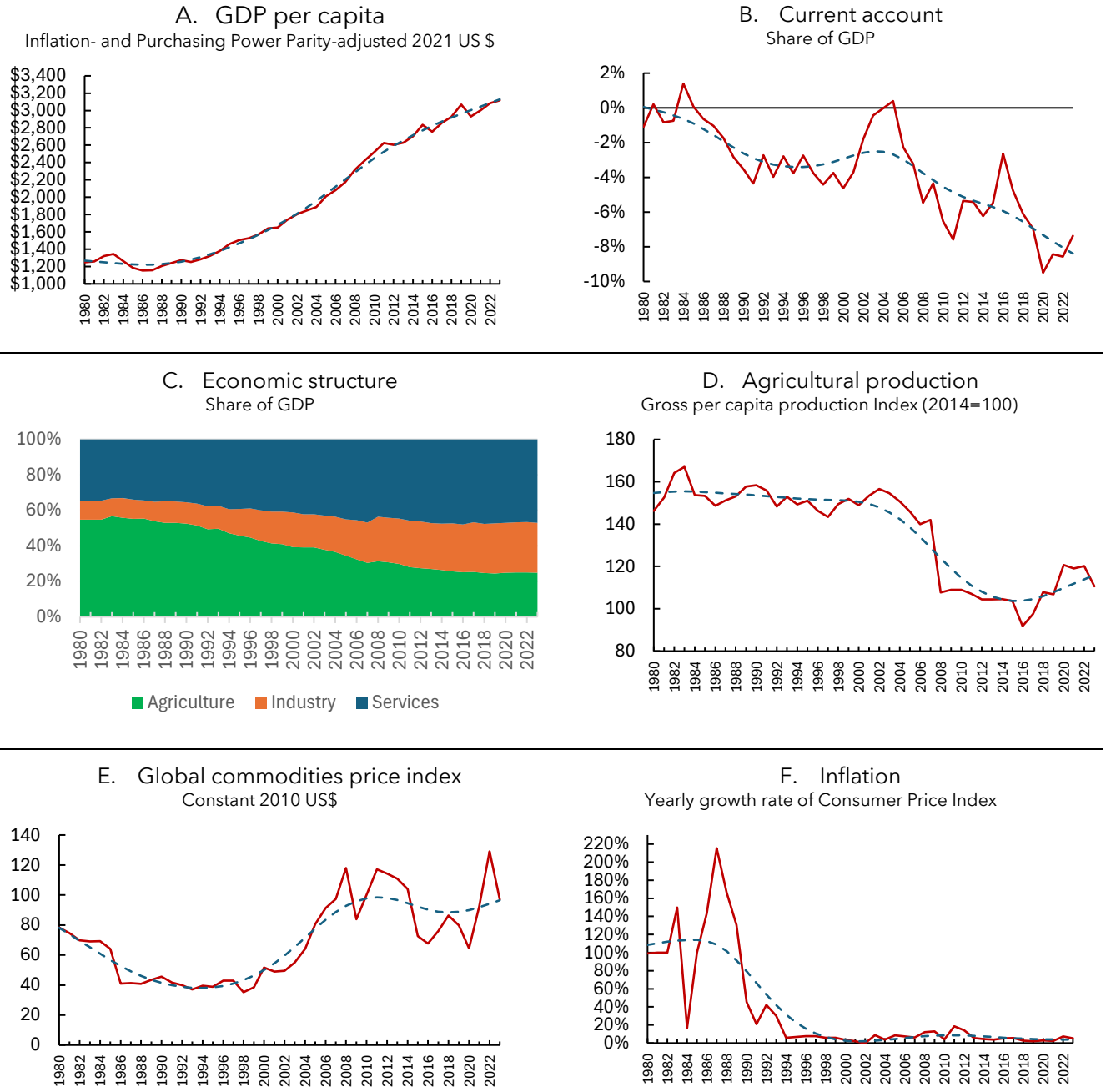
Policymaking rarely considers the economic risks around projections and shock occurrence. This is mainly because systematic analyses of economic shocks and quantification of the associated risks are lacking, especially for developing countries. We address this gap by providing country-specific economywide risk assessments and detailed risk profiles for key economic and development indicators.

Our analysis addresses two main questions:

1) How vulnerable are Uganda's national economy and population to world market and domestic production shocks?

2) What are the largest risks to Uganda's overall economic performance, private consumption, and progress toward ending poverty and hunger?

Figure 1. Historical movements of main economic indicators in Uganda



Note: The dashed blue line indicates the long-term trend. The trend calculation uses the Hodrick–Prescott filter for annual data (Hodrick and Prescott 1997).
Source: Own presentation based on GDP per capita, current account and inflation data from IMF (2024), economic structure data from World Bank (2024a), agricultural production data from FAO (2024), and global commodity price index data from World Bank (2024b).

2. Concept and Methodological Overview

Unlike conventional economic projection analysis, our assessment of economic risks does not require speculation of Uganda's future long-term economic performance. Instead, we focus on economic *volatility* and analyze simulated outcomes for the entire bandwidth of potential but realistic shock scenarios. Innovatively, we adopt the concept of *risk* as understood in finance to a macroeconomic policy analysis framework (Box 1).

Due to data limitations, we are unable to quantify the impact of social and political challenges on Uganda's economy. Instead, we assess risks to the national economy and population of Uganda belonging to two risk types:

1) **External risks** associated with shocks in international commodity prices and foreign capital flows (*world market shocks*)[1] and
2) **Domestic risks** associated with production shocks in volatile sectors of the Ugandan economy (*domestic production shocks*) are caused by extreme weather, for example.

The considered commodities are the goods and services that Uganda trades. The considered sectors are primary agriculture and hydropower electricity generation, which are essential to Uganda's economic performance and citizens' wellbeing. Given the size and diversity of the agricultural sector and its role in achieving development goals such as rural development, food security, and poverty and hunger eradication, we disaggregate agriculture into different crop and livestock production, forestry, and fishery subsectors. Our analysis focuses on exogenous shocks, which are beyond the government's direct control.

Box 1. Terminology

Risk is defined as the measurable likelihood of variation in an economic variable and, therefore, differs from *uncertainty*, which broadly refers to the (unquantifiable) unknown. *Risk* can be quantified by using statistical metrics such as variance or standard deviation that measure the degree of variation around a variable's average. Following the terminology in finance, *risk* and *volatility* have similar meanings in our analysis, but we use *volatility* in a more generic sense. *Risk* is inherent in both economic *shocks* and *outcomes*, with the risks of shocks influencing the risks of outcomes. We refer to the contribution of a given shock variable to the volatility of an outcome as a *risk factor*. The representation of the *risk factors* of an economic or development outcome ranked by their relative importance is referred to as *risk profile*. A *shock* is a sudden, measurable change that significantly disrupts the functioning of an economy or a part thereof, and an *outcome* is the resulting, measurable change in an indicator of economic performance or development.

We examine the external and domestic risks in Uganda's current economic volatility environment using available historical information for realistic scenario formulation. To do that, we developed a novel methodology – called *Systematic Risk Profiling (SRP)* – that integrates CGE modelling, data mining, and machine learning methods (Mukashov et al. 2024).

The SRP consists of three sequential steps:

1) **Data mining methods** are employed to simultaneously sample world market and domestic production shocks from annual time-series data spanning over four decades (1980 – 2023) to construct

[1] International trade flows and foreign capital flows are closely linked, and both affect Ghana's trade balance and exchange rate (see Section 4). We therefore refer to sudden changes in either or both flows as "world market shocks" for brevity.

a comprehensive set of shock scenarios that realistically represent all possible combinations of exogenous shocks for Uganda.

2) An **economywide CGE model** for Uganda is used to simulate the impacts on various (sub)sector-specific economic outcomes for each shock scenario and derive corresponding changes in development outcomes from a linked microsimulation model and
3) **Data mining and machine learning techniques** are applied to quantify the contributions of individual shock variables to the volatility of key economic and development outcomes that are then used to rank these risk factors and produce detailed risk profiles.

The selected economic outcomes are (1) the overall performance of the national economy, as measured by GDP per capita, and (2) private (or household) consumption, as measured by total consumer spending. The development outcome indicators are (3) the poverty headcount rate (measured at the official national poverty line and using per capita expenditure as a proxy for income) and (4) the prevalence of undernourishment (i.e., the share of people with insufficient calories, interchangeably referred to as "hunger" in this brief). The results of our analysis are summarized in separate risk profiles that rank the risk factors by their relative importance for each of these four outcomes.

3. Structure of the National Economy

To contextualize our SRP analysis and identify vulnerabilities in Uganda's national economy that may predefine its exposure to exogenous shocks, we first examine the economy's current structure.

Uganda is a low-income African country with a GDP per capita of USD 822 (in 2019), a national poverty headcount rate of 21.4 percent (in 2016), and an undernourishment rate of 37.3 percent (in 2019) (based on World Bank, 2024a[2]).

The sectoral structure is typical of low-income countries (Table 1a). Primary agriculture still accounts for a large share of economic activity (24.8 percent of GDP and 65.9 percent of employment). While the manufacturing sector has a relatively high GDP share at 16.7 percent, its share of employment is comparatively small at 4.9 percent (the largest subsectors are relatively capital-intensive: within agroprocessing, it is food and beverages, and cement production within other manufacturing). At the same time, manufactured goods constitute the largest share of the country's total imports (68.9 percent), with processed agricultural products (such as processed fats and oils, food, and beverages) accounting for 6.9 percent. Beverage crops (mainly coffee and tea) are the most export-intensive subsector (measured as export share of output), but their overall weight in the economy is smaller compared to larger subsectors such as food services or other services, which hold more significant shares in the country's total exports (for instance, beverage crops account for 11.5 percent, while food services account for 13.6 percent of Uganda's total exports).

On the expenditure side, the Ugandan economy also exhibits characteristics typical of low-income countries (Figure 2). Notably, the country has a high share of investment demand (26.1 percent of GDP, primarily in construction goods and imported machinery), a significant negative net trade (exports accounting for 15.7 percent of GDP versus imports at 22.1 percent), and relatively moderate government consumption expenditures amounting to approximately 8.8 percent of GDP.

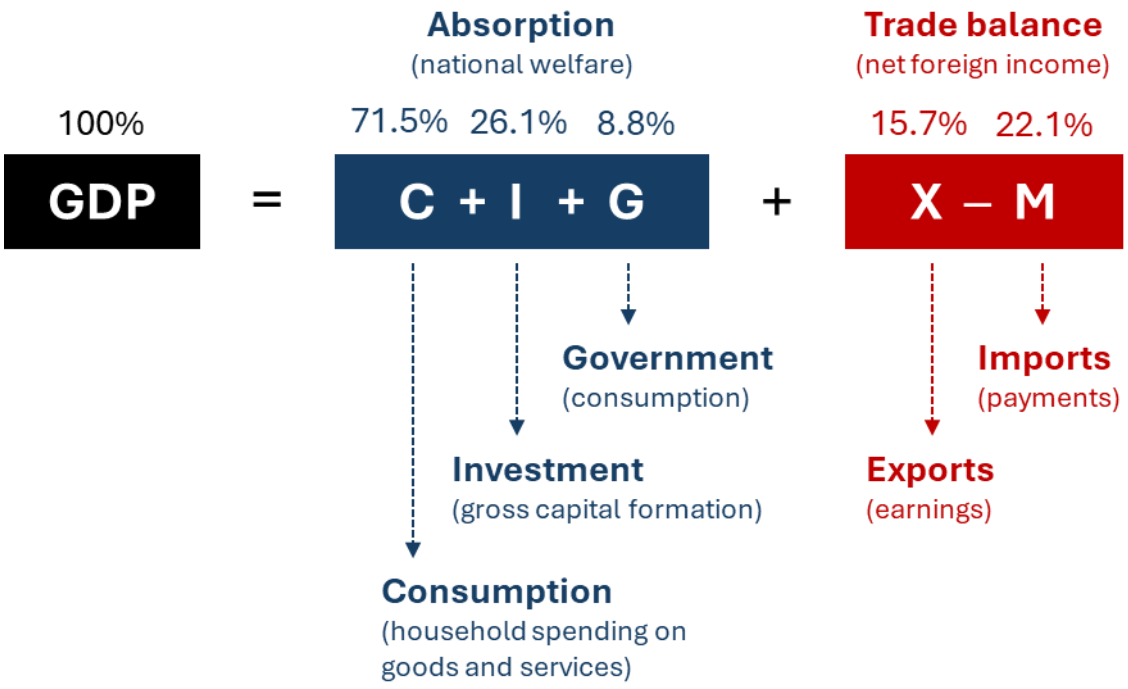
[2]. Undernourishment rate is the share of the population whose adult-equivalent daily consumption falls below the minimum calorie requirement defined by the Food and Agriculture Organization of the United Nations (approximately 1,800 kilocalories per person per day). It is possible that the undernourishment rate, as calculated by the FAO and reported by the World Bank (2024a), contains some inconsistencies that help explain why it appears higher than the national poverty rate.

In sum, Uganda's economy displays structural characteristics that predefine its vulnerability to both world market and domestic production shocks. The size of these exogenous shocks, along with the strength of economic linkages – captured in the CGE model – determines the magnitude of outcomes' volatility. However, a snapshot of the current structure of the economy does not provide evidence in this respect. An SRP analysis can aid in developing a comprehensive economic risk profile for Uganda.

Table 1. Composition of Uganda's economy by sectors

	% of total GDP	% of employment	% of total demand	Export		Import	
				% of sectoral output	% of total export	% of sectoral demand	% of total import
Primary Agriculture	24.8	65.9	11.7	17.8	22.7	2.2	1.5
Crops	14.9	39.6	5.4	32.1	22.1	4.6	1.5
Fruits	4.2	11.3	1.6	10.8	1.7	0.8	0.1
Roots	2.1	5.6	0.7	1.5	0.1	0.5	0.0
Cereals	1.8	4.8	1.0	26.1	2.8	13.9	0.8
Beverage crops	1.8	4.8	0.3	82.6	11.5	11.1	0.2
Livestock	3.2	8.5	2.3				
Forestry	4.4	11.8	2.3	1.0	0.2		
Fishing	2.2	6.0	1.7	2.6	0.4		
Mining	0.2	0.0	0.5	5.7	0.7	11.9	0.5
Manufacturing	16.7	4.9	29.9	15.5	31.1	39.7	68.9
Agroprocessing	8.6	2.5	9.8	20.5	21.4	12.1	6.9
Other manufact.	8.1	2.4	20.1	10.2	9.7	53.1	62.0
Utilities	3.9	1.2	2.6				
Construction	6.3	1.9	9.6				
Services	46.5	25.5	43.8	9.3	45.0	11.5	29.2
Food services	3.1	1.8	2.8	33.7	13.6	14.4	2.3
Social services	11.0	6.0	10.9				
Other services	32.4	17.7	30.2	9.8	31.4	15.3	26.9
Total	**100.0**	**100.0**	**100.0**	**10.3**	**100.0**	**17.2**	**100.0**

Figure 2. Composition of Uganda's economy by expenditure



Source: Own calculations based on official national accounts data for 2019 presented in the form of the Social Accounting Matrix for 2019 (IFPRI, 2023).

4. Exogenous Shocks

In the first step of our SRP analysis, we use historical time-series data and data mining methods to simultaneously sample world market and domestic production shocks.

World market shocks consist of international commodity price shocks and foreign capital flow shocks. International commodity price shocks are changes in export and import prices of the goods and services in which Uganda trades. The volatility of these prices is typically driven by global economic and financial market conditions. Foreign capital flow shocks are changes in the flow of foreign capital into the national economy. These capital inflows (comprising foreign direct investment, government and private borrowing abroad, and central bank operations) finance Uganda's trade deficit.[3] The volatility of foreign capital inflows is influenced by both Uganda's attractiveness to foreign investors and global financial market conditions.

Domestic production shocks represent productivity changes in primary agriculture and hydropower electricity generation. These sectors are most susceptible to extreme weather events (particularly droughts and river floods in the case of Uganda) and other natural hazards (such as crop pest infestations and livestock diseases).[4]

The time-series data consists of 28 shock variables over the period of 1980 – 2023. These include international commodity prices, foreign capital flow, agricultural production activities, and power electricity generation.

All observations form the dataset from which we randomly sample 10,000 shock scenarios.[5] These shock scenarios together provide a realistic representation of Uganda's economic volatility at present and in the future, as they capture all possible combinations of all observed exogenous shocks, as well as the shocks' size and direction.

The procedure involves three steps:

1) **Trend Calculation:** for each shock variable, we calculate the long-term trend over the 44-year period that is represented by a smoothed curve (shown as a dashed blue line in the graphs of Figure 1).[6]
2) **Shock Derivation:** We derive the shocks for each variable by calculating the relative deviations of the annual observations from the long-term trend.
3) **Multivariate Estimation:** From the relative deviations of all shock variables, we estimate a multivariate normal distribution and sample 10,000 multivariate shock scenarios. By randomly drawing

[3] The link of foreign capital flows to international trade flows, as well as the implications of both flows for Ghana's exchange rate, relates shocks in foreign capital flows to international commodity price shocks, but the different mechanisms of the two shock categories make them distinct. We therefore combine international commodity price shocks and foreign capital flow shocks in our simulations of world market shocks but discuss the two shock categories and the related risks separately.

[4] Domestic production shocks enter the CGE model as sector-specific total factor productivity (TFP) changes. We therefore use productivity metrics (e.g., agricultural yields) as TFP proxy indicators, whenever possible. For some (sub)sectors for which productivity metrics unavailable (that are meat and milk production, forestry, and hydropower electricity generation), we use per capita production as a proxy. See Mukashov et al. (2024) for details.

[5] The configuration of our data mining exercise to 28 shock variables and 10,000 shock scenarios is chosen to balance tradeoffs between data availability and computational intensity. It ensures that shock sampling and scenario building are well-supported by the historical data while keeping simulation and post-simulation calculations computationally feasible.

[6] To calculate the long-term trend, we use the Hodrick-Prescott filter for annual data (Hodrick & Prescott 1997). The resulting smoothed curve is less sensitive to short-term than long-term fluctuations.

shocks from this distribution (with assumed zero means and an estimated variance-covariance matrix), our analysis remains agnostic about future shocks, as the deviations found in the historical data are not strictly symmetric around zero.

Figure 3 shows the estimated marginal distributions for the 28 shock variables as box plots in Panel A and the variables' correlation structure as heatmaps in Panel B. Hence, the graphs in Figure 3A compare the scales of the sample shocks, highlighting the most and least volatile shock variables, and the graphs in Figure 3B illustrate which shocks are most and least likely to occur at the same time. In the following, we discuss the results of the first step of our SRP analysis organized by shock category.

International commodity price shocks

Our analysis of international commodity price shocks, derived from data from the World Bank (2024b) and other public databases, reveals *significant differences in volatility across sectors*. Primary commodities show particularly high volatility. Fertilizer, energy, and metal and mineral prices are the most volatile (in respective order). Within agricultural commodities, prices of beverage crops (coffee, cocoa, and tea), followed by grain prices, are the most volatile. In contrast, prices of manufactured goods and services exhibit greater stability (Figure 3A).

International price shocks for energy, metals and minerals, and fertilizers are strongly and positively correlated (Figure 3B), as global production of these commodities is interconnected. Energy and fertilizer are critical inputs into the production and processing of main agricultural crops such as grains and oilseeds, which explains the strong and positive correlation between the price shocks for these primary commodities. Similarly, the correlations between grain and oilseed price shocks and price shocks for livestock products (meat and milk and dairy products) are strong and positive because grains and oilseeds are used for animal feed in addition to direct human consumption. Altogether, the correlation patterns suggest that international price shocks are likely to affect multiple primary commodities simultaneously, mainly due to their joint dependence on global business cycles (Erten and Ocampo, 2013). The international price shocks for all goods are negatively correlated with the international price shocks for services. Thus, when the prices of goods in global markets rise above their long-term averages, the price of services tends to drop below its long-term average. Price fluctuations for services, however, are small (Figure 3A).

Foreign capital flow shocks

Uganda's current account deficit (Figure 1F) needs to be financed through foreign capital inflows. For our analysis, we assume that these flows enter the economy as foreign savings denominated in foreign currency, influencing both the exchange rate and investment demand, particularly in the construction sector.

Based on current account data from IMF (2024), fluctuations in estimated foreign savings can reach up to ±US$ 1.1 billion around the long-term average, equivalent to about 3.1 percent of total GDP (Figure 3A). Despite the link between foreign capital flows and international trade flows, *correlations between shocks in foreign capital flows and international prices of traded commodities are weak* for Uganda (Figure 3B).

Domestic production shocks

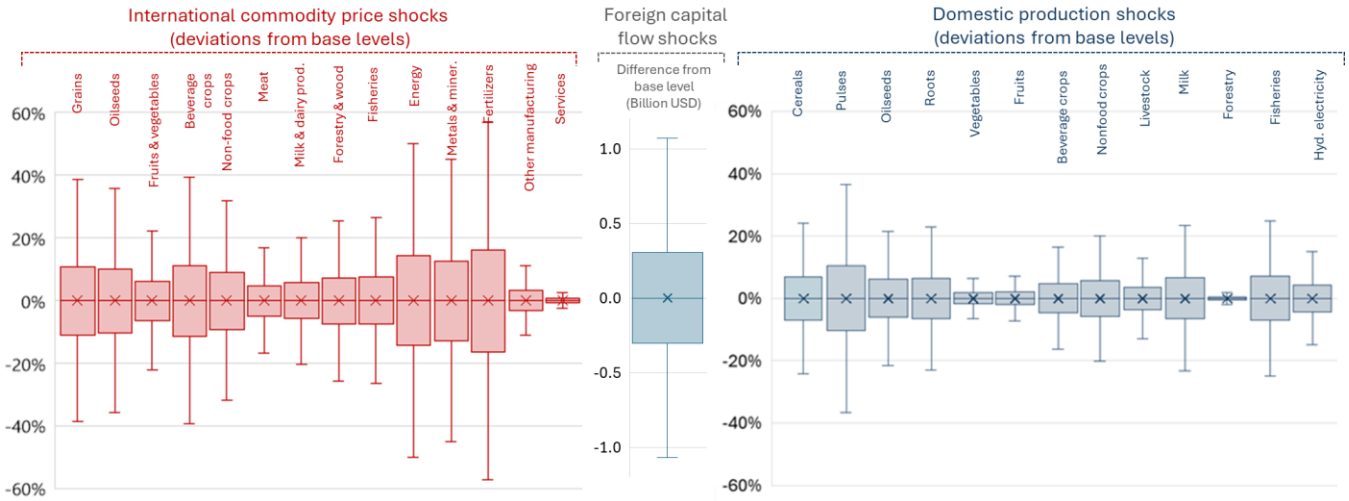
According to our historical analysis of domestic production based on the World Bank (2024a) and FAO (2024), the pulses sector in Uganda exhibits the highest production volatility, with annual variations of approximately ±37 percent relative to long-term averages. Fisheries follow with ±25 percent, and roots with

±23 percent. However, it is important to note that the pulses subsector in Uganda is relatively small compared to more significant subsectors like forestry (see Table 1). Thus, its production volatility is unlikely to substantially affect the overall economy or household welfare.

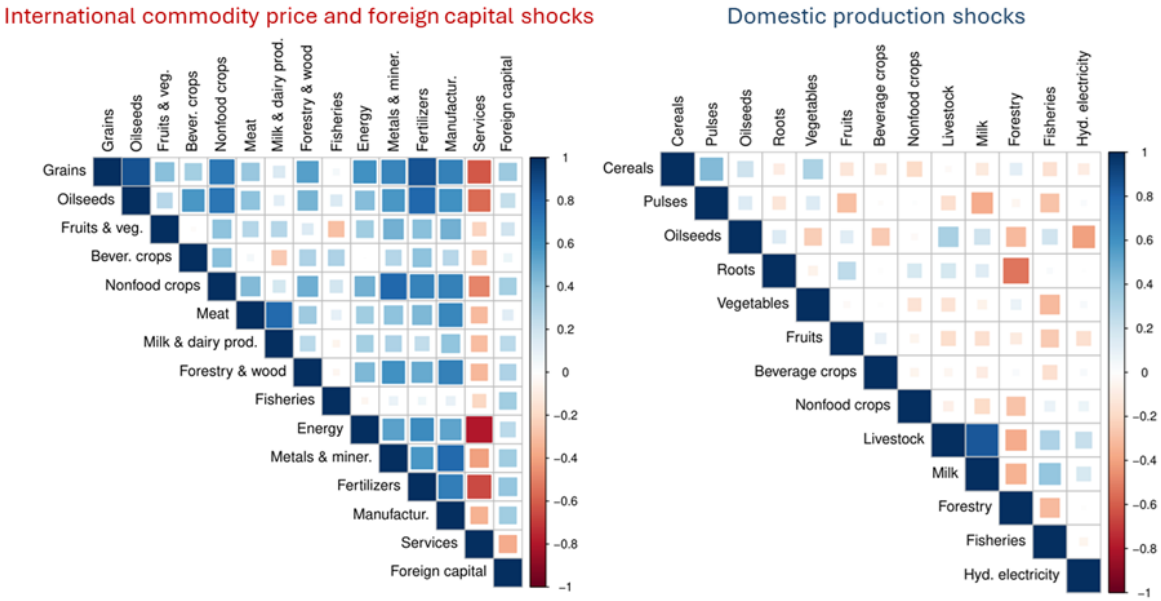
Correlations between the outputs of most domestic production activities analyzed are generally weak and show no clear directional pattern. Notable exceptions include a high positive correlation between livestock and milk, a moderate positive correlation between cereals and pulses, cereals and vegetables, and fisheries and roots, and a moderate negative correlation between forestry and roots. While these correlations offer some insight into the probability of these shocks occurring simultaneously, these estimates should be interpreted cautiously due to potential underlying data quality issues.

Figure 3. Descriptive statistics of the sampled shocks for all shock variables

A. Marginal distributions



B. Correlations



Note: The cells in the correlation heatmaps in Panel B show the strength and direction of the correlations between two variables. The sizes of the squares indicate the strength of the correlations, with non-colored cells indicating no or near zero correlations and full-colored cells indicating perfect or near-perfect correlation. Blue-colored squares indicate positive correlations, and red-colored squares indicate negative correlations.

Because of missing data, the international prices for some commodities are approximated using related price indexes or prices of similar commodities as available from the World Bank's Commodity Price Outlook Database (World Bank 2024b). The grain price index is used as a proxy for cereal, pulse, root, and milled grain prices. Orange and banana prices are used as proxies for all fresh fruit and vegetable prices (while international vegetable prices are unavailable). Energy and metal price indexes are used as proxies for all energy and metal prices, respectively. For prices of all other (non-agricultural/energy/metal) manufacturing goods, the manufacturing unit value index is used as a proxy. Additionally, the United States consumer price index for services from FRED (2024) is used as a price proxy for all internationally traded services in Uganda.
Source: Own calculation based on data from World Bank (2024a, 2024b), FRED (2024), FAO (2024), and IMF (2024).

5. Risk Profiles

In the second step of our SRP analysis, we feed the shock scenarios into an **economywide CGE model** for Uganda to simulate their impacts on various (sub)sector-specific economic outcomes.

We use IFPRI's standard CGE model, which forms part of the larger Rural Investment and Policy Analysis (RIAPA) modeling system (IFPRI 2025a). The model is calibrated to a Social Accounting Matrix (SAM) for Uganda for 2019 (IFPRI 2023; 2025b). The SAM has 46 separate domestic production activities and an equal number of separate commodity groups. A survey-based microsimulation module is linked to the CGE model to translate the simulation results into changes in household-level development outcomes such as poverty or undernourishment.

In the third step of the SRP analysis, we apply **data mining and machine learning** to:

1) Quantify how individual shocks contribute to the volatility of our four key economic and development outcomes [7]
2) Rank risk factors by their importance for overall economic performance, private consumption, poverty, undernourishment

The resulting risk profiles are discussed below.

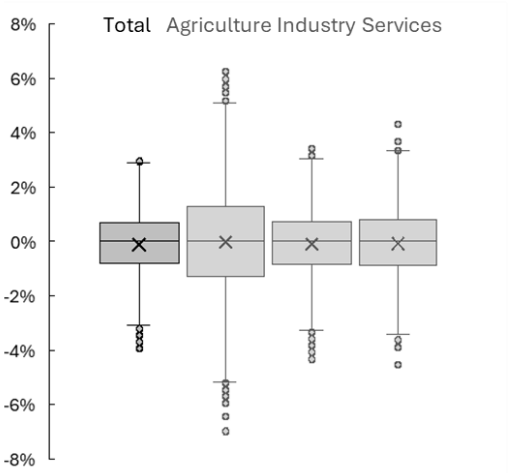
Risk profile for overall economic performance

The results of our SRP analysis show that exogenous shocks can lead to an increase of Uganda's total GDP by 3.0 percent from the baseline in the *best-case scenario* and a reduction of 4.0 percent in the *worst-case scenario* (Figure 4A) (the baseline reflects a situation in which exogenous shocks are absent). Agriculture, directly exposed to productivity shocks, is the most volatile sector, with growth ranging from -7.0 percent to +6.4 percent relative to the sector's base year value. Overall, domestic production risks account for 59.1 percent of total GDP volatility, with external risks contributing the remaining 40.9 percent (world market prices account for 39.9 percent, and foreign capital flows for the remaining 1 percent). Individually, the key risk factors are domestic production volatility of roots and livestock (rank # 1 and 2), followed by world price of beverage crops (rank # 3), and domestic production volatility of forestry and fishery (rank # 4 and 5).

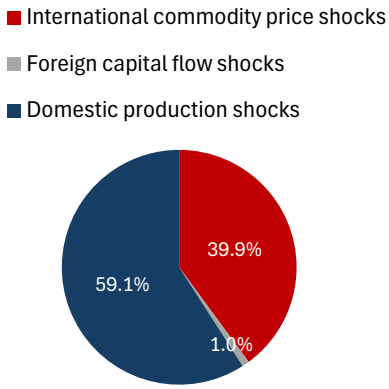
[7] We use relative importance methods by Lindeman et al. (1980) and Random Forest methods (Breiman 2001), as described in Mukashov et al. (2024) in detail.

Figure 4. Components of the risk profile for overall economic performance

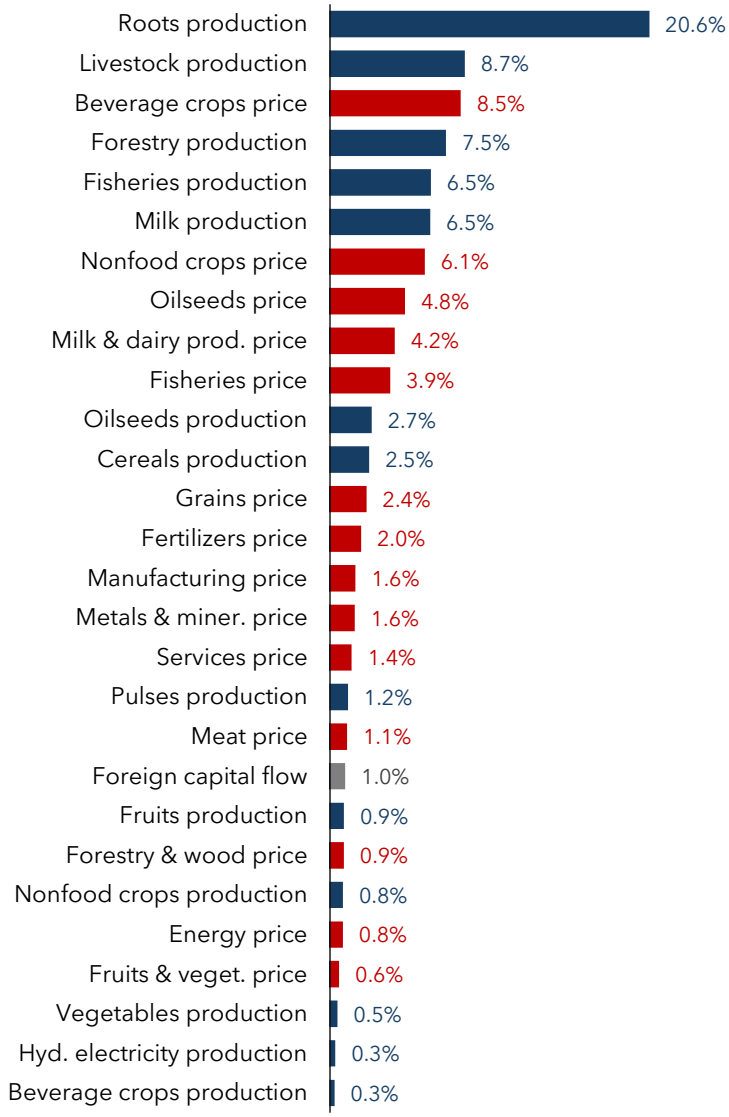
A. Volatility of total and sector GDP



B. Categories of risk factors of total GDP



C. Individual risk factors of total GDP



Risk profile for private consumption

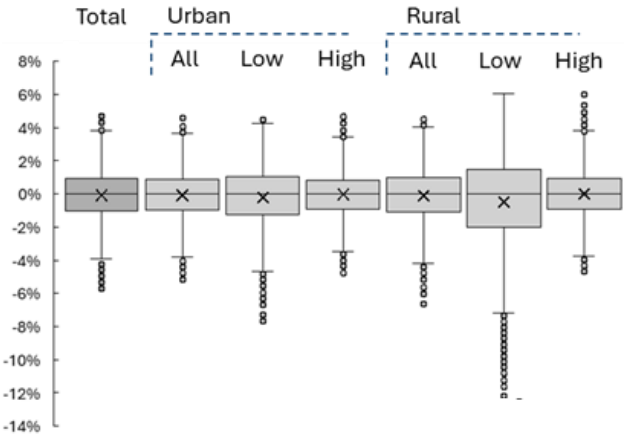
Total private consumption can fluctuate between -5.7 and +4.7 percent relative to baseline values. Comparing standard deviations, private consumption is 1.5 times more volatile than GDP, reflecting households' higher dependence on imports and exports. In total private consumption, external and domestic risk factors are nearly equally significant (50.8 percent attributed to domestic production, 28.6 percent to world market prices, and 20.6 percent to foreign capital flows). Individually, the key risk factors for total private consumption are foreign capital flows (which influence exchange rates and thus import and export prices) and production volatility in roots, fisheries, and forestry.

It is notable that private consumption volatility varies across household types (for instance, rural low-income households exhibit the highest volatility, ranging from -12.2 to +6.6 percent relative to baseline). Variations in consumption uncertainty are explained by structural differences in risk factors across household categories (Table 2).

Figure 5 Components of the risk profile for private consumption

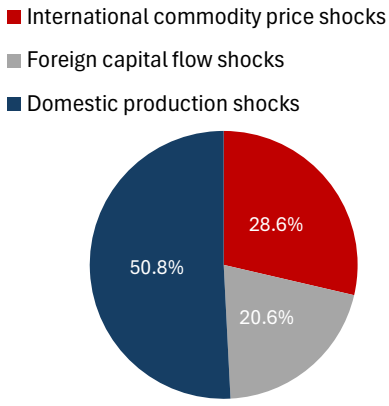
A. Volatility of private consumption by population strata

(Deviation from baseline)

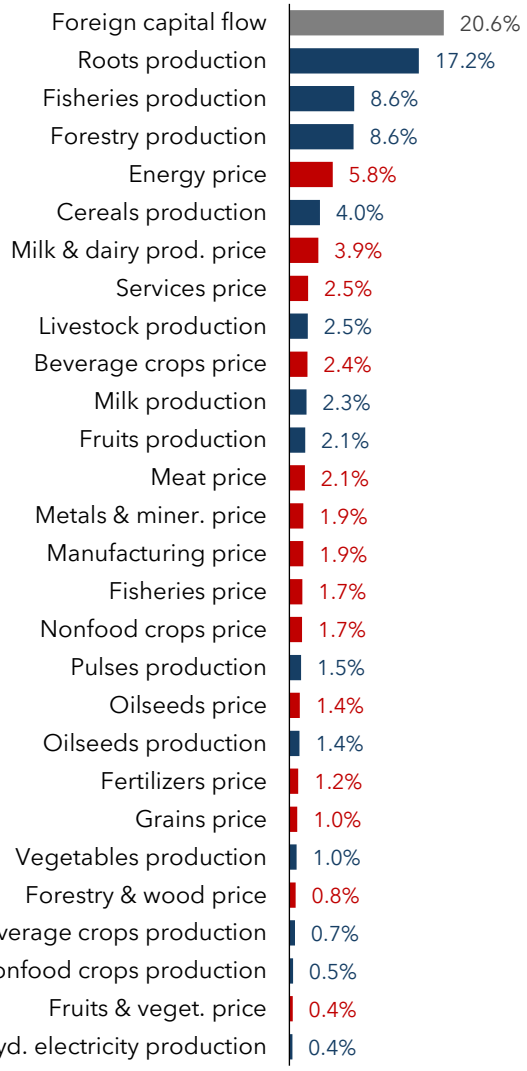


Note: "Low" and "high" refer to household income groups. Low-income households are households in the first and second quintiles of the urban or rural income distribution. High-income households are households in the fifth income quintile.

B. Categories of risk factors of total private consumption



C. Individual risk factors of total private consumption



For urban and rural high-income households, external shocks are more prominent, explaining 60.3 percent and 76.3 percent of consumption volatility, respectively (high-income rural households have heightened sensitivity to external risk factors due to factors influencing their export earnings—particularly world prices for beverage crops and foreign capital flows affecting exchange rate).

Conversely, for low- and middle-income households, domestic production volatility is the dominant risk category, accounting for over half of consumption volatility (highest for rural low-income households at 67.7 percent and lowest for urban middle-income households at 54.9 percent). Individually, production volatility in roots is the primary risk factor for low- and middle-income households. At the same time, production volatility is distinctly more important for low-income urban and rural households.

Table 2. Detailed decompositions of risk factors in consumption across household types

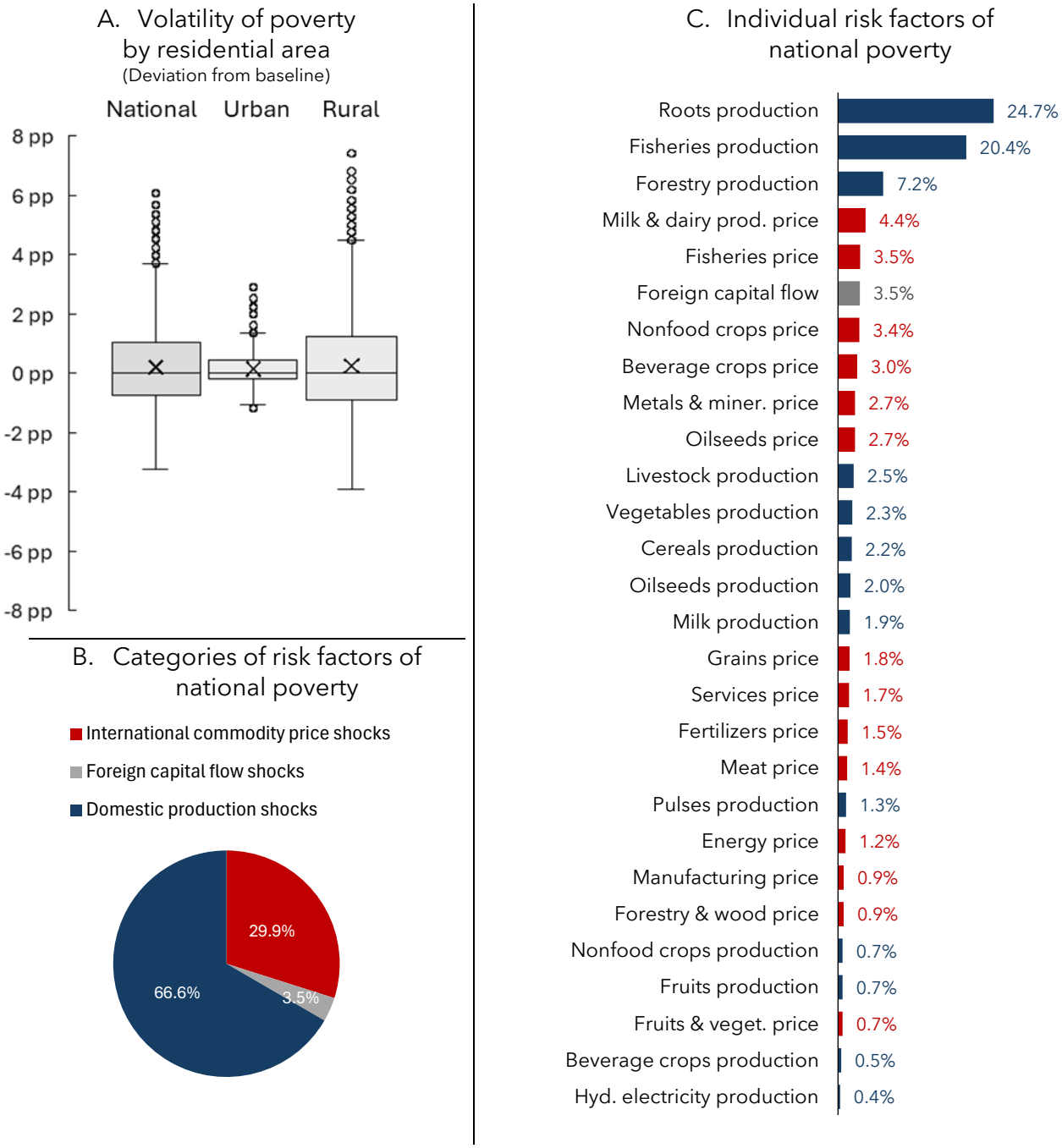
		Total	Urban				Rural			
			Total	Low	Middle	High	Total	Low	Middle	High
Total external		**49.2**	**54.0**	**39.1**	**45.1**	**60.3**	**45.3**	**32.3**	**39.9**	**76.3**
World prices	Grains	1.0	1.2	2.5	2.5	1.2	0.9	1.7	1.3	3.0
	Oilseeds	1.4	1.5	3.0	4.1	0.9	1.3	2.5	2.4	2.9
	Fruits & vegetables	0.4	1.0	0.8	0.6	1.3	0.5	0.7	0.4	0.5
	Beverage crops	2.4	2.7	2.5	5.7	1.7	2.5	3.0	3.2	5.4
	Nonfood crops	1.7	1.6	3.3	3.5	0.9	1.7	3.4	2.7	1.7
	Meat	2.1	2.1	1.7	1.6	2.1	2.0	1.3	1.7	1.5
	Milk & dairy products	3.9	3.2	4.2	3.8	2.5	4.1	4.4	4.1	1.1
	Forestry & wood	0.8	1.1	0.9	1.3	1.0	0.8	0.9	0.9	0.8
	Fish	1.7	2.3	1.8	1.7	3.2	1.5	3.4	1.6	7.4
	Energy	5.8	6.5	3.0	1.7	9.4	4.9	1.1	2.5	12.1
	Minerals	1.9	1.2	2.7	1.7	1.2	2.8	2.9	2.8	1.2
	Fertilizers	1.2	1.5	1.8	2.3	1.1	1.0	1.4	1.4	1.5
	Manufacturing	1.9	3.3	1.1	2.2	3.8	1.3	0.9	1.2	1.8
	Services	2.5	2.6	2.2	1.6	3.1	2.3	1.7	1.9	2.9
Foreign capital		20.6	22.4	7.7	10.9	26.9	17.8	3.0	11.8	32.6
Total domestic		**50.8**	**46.0**	**60.9**	**54.9**	**39.7**	**54.7**	**67.7**	**60.1**	**23.7**
Domestic productivity	Cereals	4.0	3.2	3.4	2.1	3.3	4.3	1.9	3.0	5.1
	Pulses	1.5	1.4	2.4	1.2	1.5	1.6	1.2	1.3	3.3
	Oilseeds	1.4	1.0	1.3	1.4	0.8	1.6	1.9	1.9	0.7
	Roots	17.2	13.3	21.0	27.0	6.5	18.4	25.2	26.5	1.9
	Vegetables	1.0	0.4	1.9	0.4	0.3	1.6	2.5	1.4	0.4
	Fruits	2.1	3.5	0.6	2.0	4.3	1.4	0.7	1.6	2.9
	Beverage crops	0.7	0.5	0.6	0.2	0.7	0.9	0.5	0.6	1.7
	Nonfood crops	0.5	0.7	1.0	0.5	0.8	0.5	0.8	0.4	0.6
	Livestock	2.5	5.1	0.8	4.5	5.5	1.4	2.3	2.1	2.1
	Milk	2.3	5.1	1.1	3.9	5.9	1.2	1.7	1.9	1.2
	Forestry	8.6	9.2	5.7	9.2	8.3	7.6	7.0	8.5	2.0
	Fisheries	8.6	2.3	20.6	2.3	1.5	13.7	21.6	10.3	1.2
	Hyd. electricity	0.4	0.3	0.5	0.2	0.4	0.7	0.4	0.5	0.8

Note: "Low," "Middle," and "high" refer to household income groups. Low comprises the first- and second-income quintiles, middle comprises the third- and fourth-income quintiles, and high comprises the fifth-income quintile of urban and rural households, respectively.

Risk profile for poverty

Poverty levels fluctuate in line with the consumption of low-income households, ranging from -3.2 to +6.1 percentage points relative to the baseline national poverty headcount rate of 21.4 percent. In absolute terms, this translates to 1.5 million people above the poverty line in the best scenario and 2.8 million below it in the worst scenario. At the national level, domestic production volatility constitutes the most significant risk category (66.6 percent), with the primary risk factors being production volatility in roots, fisheries, and forestry.

Figure 6. Components of the risk profile for poverty



Note: The baseline reflects a situation in which exogenous shocks are absent.

Additionally, notable differences exist in poverty risk factors across various household types (Table 3). Particularly, production volatility in the fisheries sector significantly impacts rural poverty (accounting for 21.6 percent, making it the second most important risk factor after root production volatility). Consequently, domestic risk factors carry relatively greater importance for rural poverty than urban poverty (67.5 percent for rural versus 57.6 percent for urban households).

Table 3. Detailed decompositions of risk factors in poverty and undernourishment across household types

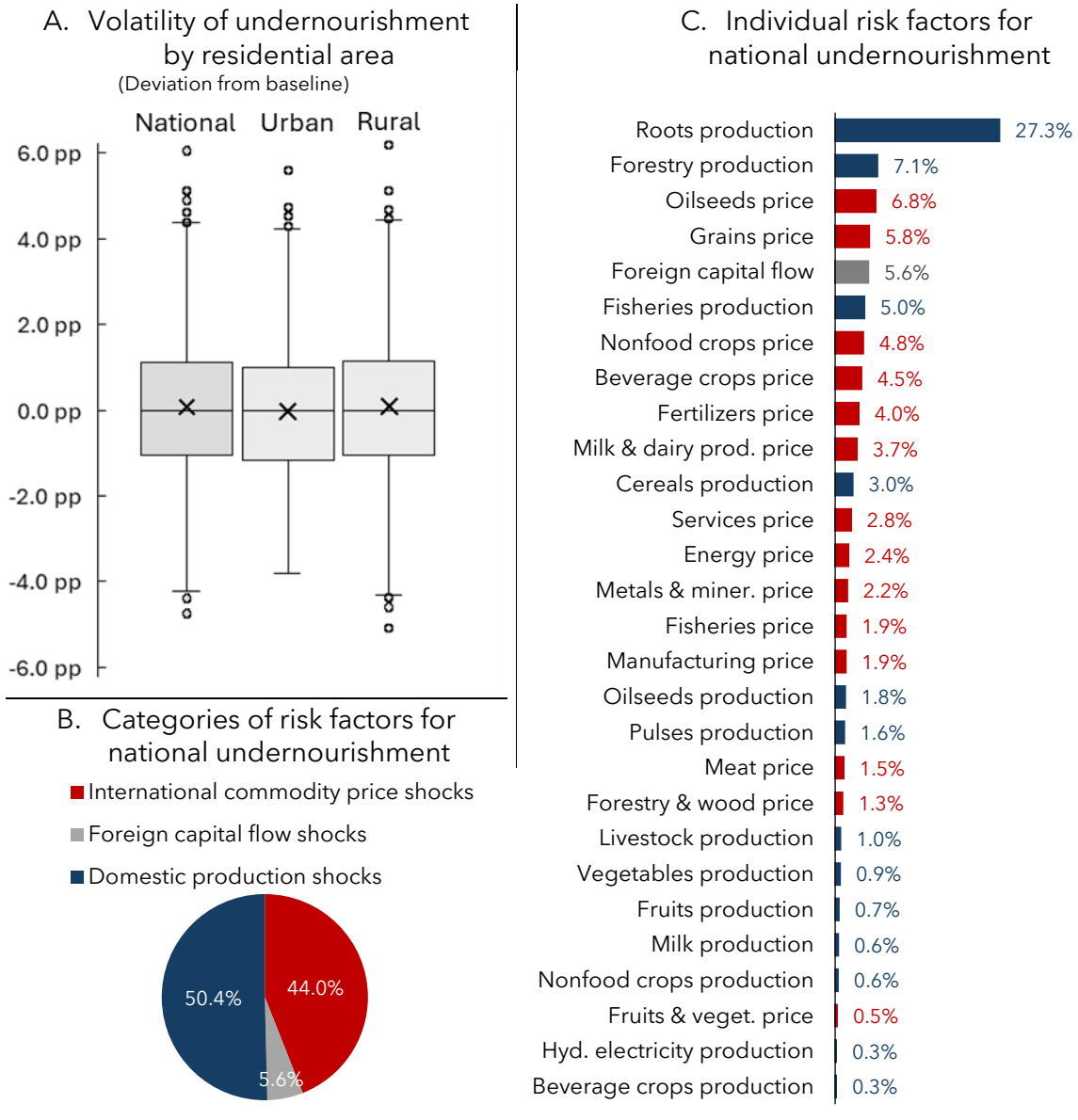
		Poverty			Undernourishment		
		National	Urban	Rural	National	Urban	Rural
Total external		33.4	42.4	32.5	49.6	55.9	47.6
World prices	Grains	1.8	3.6	1.7	5.8	6.9	5.4
	Oilseeds	2.7	5.0	2.5	6.8	8.0	6.4
	Fruits & vegetables	0.7	0.5	0.8	0.5	0.6	0.5
	Beverage crops	3.0	4.4	2.9	4.5	5.6	4.2
	Nonfood crops	3.4	4.8	3.2	4.8	5.1	4.7
	Meat	1.4	1.5	1.4	1.5	1.6	1.5
	Milk & dairy products	4.4	3.7	4.4	3.7	3.1	3.9
	Forestry & wood	0.9	1.3	0.9	1.3	1.9	1.2
	Fish	3.5	2.4	3.6	1.9	1.4	2.0
	Energy	1.2	1.7	1.1	2.4	2.7	2.2
	Minerals	2.7	2.4	2.7	2.2	2.1	2.3
	Fertilizers	1.5	2.8	1.4	4.0	4.8	3.7
	Manufacturing	0.9	1.5	0.9	1.9	2.7	1.7
	Services	1.7	2.2	1.7	2.8	2.8	2.7
Foreign capital		3.5	4.7	3.3	5.6	6.6	5.2
Total domestic		**66.6**	**57.6**	**67.5**	**50.4**	**44.1**	**52.4**
Domestic productivity	Cereals	2.2	2.1	2.2	3.0	2.8	3.1
	Pulses	1.3	1.3	1.3	1.6	2.1	1.5
	Oilseeds	2.0	1.2	2.1	1.8	1.4	1.9
	Roots	24.7	32.3	23.7	27.3	25.5	27.4
	Vegetables	2.3	1.1	2.4	0.9	0.4	1.2
	Fruits	0.7	0.7	0.8	0.7	1.2	0.6
	Beverage crops	0.5	0.4	0.5	0.3	0.2	0.3
	Nonfood crops	0.7	0.6	0.8	0.6	0.5	0.7
	Livestock	2.5	1.1	2.7	1.0	1.0	1.0
	Milk	1.9	0.7	2.1	0.6	0.7	0.6
	Forestry	7.2	7.2	7.1	7.1	7.0	7.1
	Fisheries	20.4	8.7	21.6	5.0	1.1	6.7
	Hyd. electricity	0.4	0.3	0.4	0.3	0.2	0.4

Risk profile for undernourishment

The undernourishment rate can fluctuate between -4.7 and +6.0 percentage points relative to the baseline national undernourishment rate of 37.3 percent. This represents 2.2 million people moving above the undernourishment threshold in the best-case scenario and 2.8 million falling below it in the worst-case scenario.

Notably, unlike poverty—which is predominantly influenced by domestic risk factors—national undernourishment is equally dependent on domestic and external risk factors (domestic production accounts for 50.4 percent, world market prices for 44.0 percent, and foreign capital flows for 5.6 percent). Additionally, there are notable variations in risk factors affecting undernourishment across different household types (Table 3).

Figure 7. Risk profile for undernourishment



Note: The baseline reflects a situation in which exogenous shocks are absent.

6. Conclusions

Achieving development goals –like becoming a higher middle-income country or ending poverty and hunger by 2030–is subject to economic uncertainties. Yet policymaking rarely incorporates risk assessments, relying instead on deterministic trend projections.

To address this gap, inform national development strategies, and complement standard economic projections, *Systematic Risk Profiling* (SRP) provides a novel approach integrating CGE modeling, household microsimulation, and machine learning. Our SRP exercise for Uganda assesses the risks from exogenous shocks for the national economy and population and simulates the potential impacts of these shocks on the country's overall economic performance, private consumption, poverty, and undernourishment.

Our findings indicate that domestic production volatility is the most significant risk factor for GDP and poverty, while for household consumption and undernourishment, world market and domestic risk factors are equally important. Individually, the most critical risk factors include volatility of roots production, foreign capital flows, and fishery production (which is particularly critical for rural low-income households).

The analysis presented in this Country Brief provides an initial assessment of major economic risks in Uganda. Understanding these risks is a critical first step in facilitating discussions on potential risk management strategies such as promoting domestic productivity growth, adopting technologies and practices for reducing production uncertainty, and diversifying economic activity away from high-risk sectors. The next step would be for national policymakers or advisors to evaluate alternative risk management strategies.

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