

Macroeconomic Impact of Foreign Remittances on Afghanistan's Agriculture Sector

Ayaz Khan Naseri^{✉1}, Safiullah Jauhar²

¹Kabul University, Department of Agricultural Economics and Extension, Faculty of Agriculture, Kabul, AF

²Department of Food Technology, Faculty of Agriculture, Kabul University, Kabul, Afghanistan

✉ Email: nasariayaz@gmail.com (corresponding author)

ABSTRACT

The study delved into the shock of foreign remittances to Afghanistan's agricultural industry, which accounts for 37% of the fiscal year's budget. It utilizes a computable general equilibrium model and social accounting matrix to evaluate the short-term macroeconomic responses of 2018 foreign remittance changes using GAMS software. The research explores eight scenarios based on percentage changes in foreign remittance, comparing Afghanistan's actual foreign remittance values to a baseline scenario. The results investigated a correlation between domestic production in agriculture sub-sectors and foreign remittance variables. Scenario H depicts swelling percentages for domestic production of cereals, fruits, vegetables, livestock, and opium, whereas scenario D illustrates declining percentages. Contracted remittances decline prices, while scenarios with enhanced remittances upsurge the purchasing power of agricultural products, particularly cereals. Dropping foreign remittances leads to lower labor and capital share in all agriculture sectors; however, soaring remittances boost agricultural purchasing power. Household consumption drops in all agricultural sectors except cereals due to a fall in foreign remittances. The study recommends that the government boost investment in the agriculture sector, use skilled immigrants as scientific capital, and encourage migrant investors to invest in sustainable agriculture to promote sustainable consumption.

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Introduction

Remittances, money, or commodities sent by migrants to their home countries are a significant source of income for developing countries, accounting for 0.8% of global GDP (Migration Data, 2021; WB¹, 2021; WB, 2020). They can increase GDP and finance investments, reducing poverty. Remittances stabilize income and consumption while safeguarding families' human capital investment (Barajas et al., 2009; Clemens and

¹ World bank

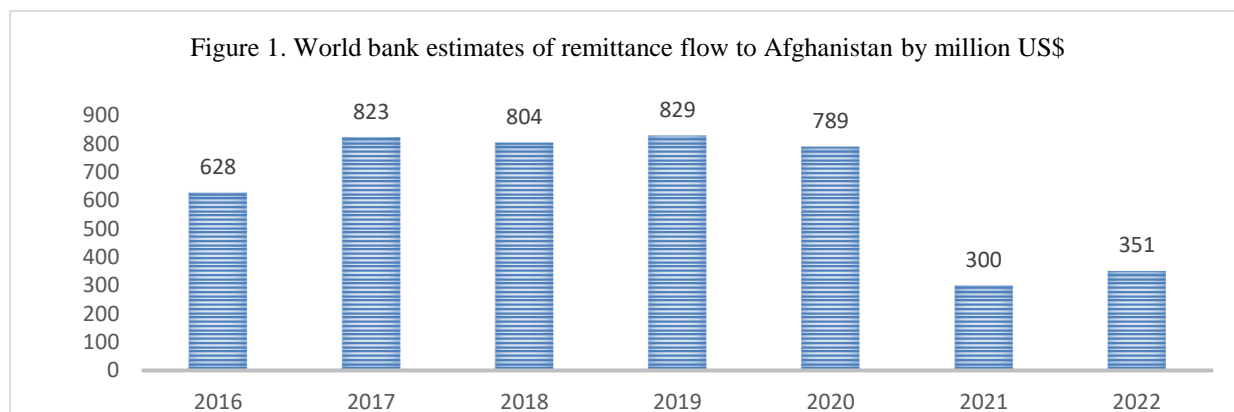
McKenzie, 2014; KNOMAD, 2016; Pradhan et al., 2008; World Bank, 2016a). However, they can also reduce the labor supply of other family members, which is largely unavoidable. Remittances include regular and irregular transfers to support the family back home, with accumulated resources mainly intended for investment use (Wahba, 2014; Wahba, 2015). Positive remittance shocks upsurge consumption and exchange rates in terms of trade, leading to diminished output and improved demand, eventually causing inflation due to the output cut and augmented consumption demand (Urama, 2016). This inflow relaxes foreign exchange constraints and allows for the import of investment goods, fostering investment. Remittances impact household income by increasing consumption, saving, and investment levels. In their developmental dimension, they reduce unemployment, generate greater foreign exchange earnings, increase saving rates, and increase social returns on investments in human resource development.

A paper by ADB² (2017) estimated that a 1% surge in international remittances as a percentage of GDP can lead to a 22.6% decline in the poverty gap ratio and a 16.0% decline in the poverty severity ratio (Mint, 2020). Most developing countries are foreign exchange-restricted, and Afghanistan heavily relies on imports (Bird, 2016). Afghanistan faces a prolonged humanitarian crisis due to economic shocks and reduced Official Development Assistance (ODA) following the August 2021 regime change. The country ranks among the highest on the climate risk index score, with high levels of hazard exposure and limited coping capacities. Between May and October 2023, an estimated 15 million Afghans are likely to be acutely food-insecure, including 2.8 million facing emergency food insecurity (ACAPS, 2023). The World Bank report on remittances in Afghanistan states that about 15% of rural households receive remittances from foreign countries, covering around 20% of their daily expenditure. However, the actual size of remittances is believed to be more significant. Remittances are a non-negligible part of the national economy and provide cash income for individuals and families coping with Afghanistan's difficult economic and humanitarian situation. Figure 1 shows that in 2020, Afghans received an estimated USD 788.9 million in remittances, representing 4.1% of the national GDP. However, this proportion dropped by over half in 2021, to 2% of GDP. The absolute volume rose in 2022 to USD 350 million, but this is not expressed as a percentage due to the lack of reliable figures on the 2022 GDP. The drop in 2021 is likely due to financial system disruptions after the August 2021 regime change and international sanctions.

The World Bank report shows Afghanistan's budget income for the financial year from March 21, 2022, to March 20, 2023, was recorded at 2.05 billion dollars, with 2.2 billion dollars for current expenses and 0.3 billion for development allocation. A \$500 million deficit is unfunded. Afghanistan's remittances from 2017 to 2020 accounted for 37% of the 2022

² Asian Development Bank

budget. The study aims to apply a computable general equilibrium model to the agriculture sector in Afghanistan, a topic not previously explored in research. The lack of relevant research and the large contribution of remittances to Afghanistan's budget revenue are the driving forces behind this study. It will inspire further investigation into the impact of remittances on the agricultural industry and provide policymakers with valuable information on macroeconomic factors in this pivotal sector.



Source: ACAPS using WBG (accessed 22/07/2023)

The specific objectives of this study are:

1. Evaluate the impact of foreign remittances on the agriculture sector in Afghanistan.
2. Assess macroeconomic factors affected by foreign remittances.
3. To recommend suitable policies based on agricultural insights to boost the economy.

Foreign remittances are pivotal economic factors in developing countries, contributing to growth. While some authors suggest remittances have a positive influence, others argue they have an insignificant impact. The literature lacks conclusive evidence for a universal cause-and-effect relationship between remittances and macroeconomic variables, making the relationship between remittances and macroeconomic variables ambiguous. The inconsistent results are often due to the varying significance of remittances in receiving countries. A country-specific study could better capture the response of remittances to macroeconomic fluctuations (Mughal and Ahmed, 2014). The study by Chhetri et al. (2020) delved into the impact of remittance on the Nepalese economy, finding no significant correlation between remittance inflow and agricultural land increase. Remittances have been beneficial in reducing poverty and unemployment, maintaining foreign exchange reserves, and correcting the balance of payments.

However, labor shortages in agriculture and non-agricultural sectors persist due to active youth in foreign employment. The rapid increase in remittance volume shows a shift from an agriculture-based to a remittance-based economy. Stark (1980) suggests that while foreign migration may negatively impact agricultural yield, it can also enhance the capacities of households receiving remittances, ultimately growing yield. Imai & Bresciani (2017) argued that migrant income should be invested in agricultural production to create employment

opportunities and improve food productivity. Davis (2007) discovered that migrant households diversified their livelihood activities, shifting from labor-intensive agriculture to livestock due to a significant remittance volume. Remittances can have significant consequences for the economy, particularly in developing countries. Amuedo-Dorantes (2014) discovered that remittances could increase non-tradable goods consumption, raise prices, appreciate the real exchange rate, and decrease exports, potentially damaging the receiving country's competitiveness in global markets. Remittances also decrease poverty, swell household welfare, and surge food and housing expenditures. In developing countries, international remittances boost household income and lower poverty. Remittance-receiving households spend less on consumption goods like food and more on investment items like education and housing. In Bangladesh, remittances confidently stimulate spending in almost all categories (Adams, 2005; Castaldo and Reilly, 2007; Raihan et al., 2009; Raihan et al., 2020). Pablo et al. (2007) and Van et al. (2005) proved that a rise in remittances can bring down labor supply and consumption demand, primarily for non-tradable goods, and adversely impact labor force disposal for economic development in emigrant home countries. Remittance income can decrease labor supply in various countries, with higher levels affecting both male and female labor supply. However, augmented remittance volatility can boost employment likelihood for both genders. International migration can also decrease labor force participation in Nicaragua, El Salvador, and Mexico. Remittances can also condense the labor supply for remittance-receiving women in Mexico, and individuals in remittance-receiving households in Tajikistan are less likely to participate in the labor market and work fewer hours (Amuedo-Dorantes and Pozo, 2012).

Methods and Materials

The study utilized the International Food Policy Research Institute's standardized computable general equilibrium (CGE) model (Lofgren et al. 2002) to understand the economic dynamics of price, supply, and demand. Based on Walras' law, the model assumes perfect competition, full employment, and a constant return to scale in a small and open economy. Due to data limitations, the study used the static model in Afghanistan, which is commonly used in policy analysis since it can be adjusted to the features of emerging nations. The model was based on the Biruni Institute's Social Accounting Matrix (SAM), created using data from sources like the National Statistics & Information Authority's Input-Output Table 2018, the Afghanistan Living Conditions Survey, and the Ministry of Finance Fiscal Bulletins. The SAM calibration process uses literature elasticity values to estimate the constant elasticity of substitution and transformation functions. Armington elasticities with varying rates were estimated for various items, while transfer elasticities for cereals, fruits, vegetables, livestock, forestry, and opium were estimated at 0.9 (Kafaei and Miri, 2019; Saeednia et al., 2020).

Model Equations

In order to believe that the combination of labor and capital creates value-added, producers use Cobb-Douglas production technology at the lowest level to maximize profits. It is mentioned in Equation 1.

$$VA_j = b_j \prod_h FD_{hj}^{\beta_{hj}} \quad (1)$$

In the upper level, intermediate inputs and added value are combined to create final items using the Leontief production function.

$$Y_j = \min \left(\frac{X_{ij}}{ax_{ij}}, \frac{VA_j}{ay_j} \right)$$

All producers maximize their profit in relation to their output by employing the previously mentioned approaches, which results in the following formulas being determined:

$$X_{ij} = ax_{ij} \cdot Y_j \quad \forall j \quad (2)$$

$$VA_j = ay_j \cdot Y_j \quad \forall i \quad (3)$$

$$FD_{hj} = VA_j \cdot \frac{\beta_{hj} \cdot PN_j}{W_h} \quad (4)$$

$$PS_j = ay_j \cdot PN_j + \sum_i ax_{ij} \cdot PQ_i \quad \forall i \quad (5)$$

The utility function will be optimized by using the household budget. As a consequence, equation (6) will be found.

$$C_i PQ_i = \delta_{Ci} \left(\sum_h W_h \cdot FS_h - TAX_{dir} - SAV_{hoh} \right) \quad \forall j \quad (6)$$

The main source of money for the government is taxation, which is subsequently utilized to pay for operating costs and savings.

$$TAX_{ind.j} = tx_j \cdot PS_j \cdot Y_j \quad (7)$$

$$TAX_{dir} = td \cdot \sum_h W_h \cdot FS_h \quad (8)$$

$$TARIFF_j = tm_j PM_j M_j \quad (9)$$

The total of all savings—private, public, and foreign—makes up the investment, with foreign savings as an exogenous variable affecting the trade balance and currency rate.

$$SAV_{hoh} = S_{hoh} \sum_h W_h \cdot FS_h \tag{10}$$

$$SAV_g = S_g \left(\sum_j TAX_{ind,i} + \sum_i TARIFF_i + TAX_{dir} \right) \tag{11}$$

$$SAVING = (SAV_h + SAV_{gov} + SAV_f) \tag{12}$$

$$SAVING = INVESTMENT \tag{13}$$

$$ID_i \cdot PQ_i = \mu_j \cdot INVESTMENT \tag{14}$$

There is a small country that engages in international trade, which keeps import and export prices stable worldwide.

$$PE_i = pwe_i \cdot EXR \tag{15}$$

$$PM_i = pwm_i \cdot EXR \tag{16}$$

The Armington function assumed that imports are imperfect substitutes for domestic products, demonstrating the relationship between imports and domestic production based on the constant elasticity of substitution.

$$Q_i = \gamma_i (\alpha_{mi} M_i^{\rho_{mi}} + \alpha_{di} D_i^{\rho_{mi}})^{\frac{1}{\rho_{mi}}} \tag{17}$$

Equations (18) and (19), which represent demand functions for imports and domestic output, are the result of solving the maximizing problem.

$$M_i = \left(\frac{\gamma_i^{\rho_{mi}} \cdot \alpha_{mi} \cdot PQ_i}{(1 + tm_i) PM_i} \right)^{\frac{1}{1-\rho_{mi}}} \cdot Q_i \quad \forall j \tag{18}$$

$$D_i = \left(\frac{\gamma_i^{\rho_{mi}} \cdot \alpha_{di} \cdot PQ_i}{PD_i} \right)^{\frac{1}{1-\rho_{mi}}} \cdot Q_i \quad \forall j \tag{19}$$

The exports and domestic production relationship are based on a constant transmission elasticity function (CET), assuming exports are an imperfect substitute for domestic production.

$$Y_i = \theta_i (\beta_{ei} E_i^{\rho_{mi}} + \beta_{di} D_i^{\rho_{mi}})^{\frac{1}{\rho_{mi}}} \tag{20}$$

The supply functions of exports and domestic commodities will be produced by solving the maximizing problem as relations (21) and (22), respectively.

$$E_i = \left(\frac{\theta_i^{\rho_{mi}} \cdot \beta_{ei} (tx_i + PS_i)}{PE_i} \right)^{\frac{1}{1-\rho_{mi}}} \cdot Y_i \quad (21) \forall j$$

$$D_i = \left(\frac{\theta_i^{\rho_{mi}} \cdot \beta_{di} (tx_i + PS_i)}{PD_i} \right)^{\frac{1}{1-\rho_{mi}}} \cdot Y_i \quad (22) \forall i$$

The adjusting factors that may be utilized to balance supply and demand in the labor force, capital, and foreign exchange include the wage rate, interest rate, composite product price, and exchange rate.

$$\sum_i FD_{hj} = FS_h \quad \forall_f \quad (23)$$

$$Q_i = C_i + G_i + \sum_i X_{ij} \quad \forall_j \quad (24)$$

$$\sum_i pwe_i E_i + SAV_f = \sum_i pwm_i M_i \quad (25)$$

The price normalization equation is utilized to achieve equilibrium by setting a fixed price index and measuring changes in other prices relative to it.

$$PINDEX = \sum_i \omega_i PQ_i \quad (26)$$

The study identifies households as the primary labor input and capital owners, resulting in total labor income. Government transfer payments and receipts from the outside world are also considered household income sources.

$$HOH_y = \sum_h W_h \cdot FS_h + gov_{hoh} + remit_{hoh} \cdot EXR \quad (27)$$

The New Classic model, a closed-loop system, applies an exogenous shock related to foreign remittances through the remit variable in equation (27), assuming full employment and investment equal savings in all markets. GAMS software was used to solve the model and run the scenarios. Appendix 1 includes indices, variables, and parameters linked to the model equations.

Results & Discussions

Model Calibration

The results of the SAM calibration process, based on earlier literature, indicate that the export substitution elasticity in the transformation function is elastic for all agriculture categories. In contrast, the import substitution elasticity in the Armington function is inelastic. Deviations in share and transfer parameters exist for every subsector of agriculture. All other parameters are projected to be zero except for the elasticity parameter in the transformation function (the elasticity parameter in the transformation function is equal to 2.1), as import and export of opium are not legally relevant issues.

Model Simulation

The research explores eight scenarios based on percentage changes in foreign remittance, comparing Afghanistan's actual foreign remittance values to a baseline scenario. The study aims to assess the short-term impacts of macroeconomic variables on foreign remittance changes in 2018 by comparing actual values to a baseline scenario and examining diverse scenarios to determine percentage changes across various agricultural categories. The exact value was estimated at a million Afg. In more detail, the consequences of a 25%, 50%, 75%, and 100% decline in the 2018 foreign remittance volume are tested in scenarios A, B, C, and D. Scenarios E, F, G, and H examine the implications of increases of 25%, 50%, 75%, and 100% in the volume of international remittances in 2018.

Table 2. Foreign Remittance Changes Scenarios

Scenarios	Definition of scenarios
Baseline	Benchmark equilibrium
Scenario A	25% Reduction in foreign remittance
Scenario B	50% Reduction in foreign remittance
Scenario C	75% Reduction in foreign remittance
Scenario D	100% Reduction in foreign remittance
Scenario E	25% Rise in foreign remittance
Scenario F	50% Rise in foreign remittance
Scenario G	75% Rise in foreign remittance
Scenario H	100% Rise in foreign remittance

As shown in Table 3, the study reveals a correlation between the domestic production of agriculture sub-sectors and the foreign remittance variable. Reducing foreign remittances leads to lower domestic production across all agriculture sectors, but this reverses when remittances increase. The rate of decline in domestic production is higher in scenario D compared to other reduction scenarios. The percentage of foreign remittance gradually

upsurges from E to H in rising scenarios. The scenarios show varying remittances for cereals, fruits, vegetables, livestock, and opium. More specifically, scenario H displays growing percentages for cereals, fruits, vegetables, livestock, and opium (1.389), (5.754), (10.356), (4.006), and (5.269), while scenario D depicts declining percentages for the same (-1.799), (-3.981), (-4.965), (-3.860), and (-5.116), respectively. The study aligns with antecedent literature suggesting that migrant income should be invested in agricultural production to create employment opportunities and improve food productivity (Imai and Bresciani, 2017).

Table 3. Impact of Changes in Foreign Remittances on Domestic Production

Scenarios	Percentage change from the base value				
	Cereals	Fruits	Vegetables	Livestock	Opium
Base value	124819	88269	24574	55619	160474
Scenario A	-0.248	-0.946	-1.233	-0.940	-1.185
Scenario B	-1.425	-2.264	-2.824	-2.059	-2.956
Scenario C	-1.658	-3.197	-4.037	-2.990	-4.115
Scenario D	-1.799	-3.981	-4.965	-3.860	-5.116
Scenario E	-0.461	1.009	1.868	0.865	0.859
Scenario F	0.177	2.642	4.749	1.933	2.386
Scenario G	0.780	4.204	7.549	2.965	3.818
Scenario H	1.389	5.754	10.356	4.006	5.269

Household income rises, leading to augmented consumption. If remittances are less than the matrix level, household income falls, affecting purchasing power. Table 4 exhibits that dwindled remittances declined in price. However, scenarios with increased remittances surge the purchasing power of agricultural products, particularly cereals, which play a vigorous role in Afghanistan's food security. Improved demand leads to higher prices for related foods. Cereals make up 73% of calories consumed in Afghanistan (WB, 2012). The study's findings align with Amuedo-Dorantes' (2014) research, which suggests that remittances can boost non-tradable goods consumption, raise prices, appreciate exchange rates, and decrease exports, potentially affecting the receiving country's global market competitiveness.

Table 4. Impact of Changes in Foreign Remittances on Supply Price

Scenarios	Percentage change from the base value				
	Cereals	Fruits	Vegetables	Livestock	Opium
Base value	0.999288	0.99983	0.999697	0.99982	0.999168
Scenario A	-0.066	-0.024	-0.023	-0.055	-0.024
Scenario B	-0.142	-0.088	-0.056	-0.128	-0.118
Scenario C	-0.208	-0.112	-0.079	-0.183	-0.141
Scenario D	-0.258	-0.120	-0.087	-0.222	-0.149
Scenario E	0.054	-0.025	0.012	0.022	-0.033

Scenario F	0.079	-0.052	-0.004	0.016	-0.003
Scenario G	0.084	-0.101	-0.040	-0.012	0.015
Scenario H	0.089	-0.150	-0.076	-0.039	0.032

The study reveals a link between the labor share of agriculture sub-sectors and the overseas remittance variable. Falling foreign remittances lead to a lower labor share across all agriculture sectors, but this reverses when remittances grow. In swelling scenarios, the foreign remittances percentage change points to a progressive upsurge from E to H, while the scenario A to scenario D percentage change illustrates a gradual drop. More precisely, the percentage change in cereals ranged from -0.306 to -2.077 in reducing scenarios and from -0.440 to 1.671 in rising scenarios. Fruits and vegetables also experienced varying percentage changes, with -1.003 to -4.251 for fruits, -1.285 to -5.236 for vegetables, -1.000 to -4.131 for livestock, and -1.242 to -5.383 for opium. The cereal percentage in rising scenarios varied from -0.440 to 1.671; however, fruits, vegetables, livestock, and opium percentages increased from (1.030) to (6.049), (1.886) to (10.662), (0.886) to (4.297), and (0.879) to (5.562). The study's findings followed Amuedo-Dorantes and Pozo's (2012) and Chhetri et al.'s (2020) investigations, which found that remittance has reduced poverty, unemployment, and foreign exchange reserves. However, labor shortages persist in agriculture and non-agricultural sectors due to active youths in foreign employment.

Table 5. Impact of Changes in Foreign Remittances on Labor Share

Scenarios	Percentage change from the base value				
	Cereals	Fruits	Vegetables	Livestock	Opium
Base value	46376	36601	9492	22900	38010
Scenario A	-0.306	-1.003	-1.285	-1.000	-1.242
Scenario B	-1.598	-2.434	-2.992	-2.231	-3.125
Scenario C	-1.887	-3.421	-4.256	-3.218	-4.338
Scenario D	-2.077	-4.251	-5.236	-4.131	-5.383
Scenario E	-0.440	1.030	1.886	0.886	0.879
Scenario F	0.285	2.754	4.857	2.044	2.497
Scenario G	0.975	4.407	7.754	3.162	4.017
Scenario H	1.671	6.049	10.662	4.297	5.562

Many factors stimulate the capital structure, including business risk, asset growth, sales growth, earnings, and asset structure. As outlined in Table 6, the study reveals that a drop in foreign remittances leads to a decline in the share of capital in all agricultural sectors but reverses when remittances intensify. The percentage change of foreign remittances gradually surges from E to H in rising scenarios. In contrast, the percentage change shows a gradual cut from scenario A to scenario D. scenario H also demonstrates the highest growing

percentages for cereals, fruits, vegetables, livestock, and opium. In contrast, scenario D portrays the lowest declining percentages for these items. The study's findings align with previous research suggesting that remittances are regular or irregular transfers to support families for investment, facilitating the import of investment goods and boosting household income. They directly impact consumption, saving, and investment levels, affecting GDP indirectly. The inflow of remittances leads to augmented consumption and investment, determining GDP (Levine, 2005; Narang, D. 2020; Pradhan et al., 2008; Wahba, 2014; Wahba, 2015).

Table 6. Impact of Changes in Foreign Remittances on Capital Share

Scenarios	Percentage change from the base value				
	Cereals	Fruits	Vegetables	Livestock	Opium
Base value	56744	44784	11614	28019	46508
Scenario A	-0.199	-0.898	-1.188	-0.892	-1.137
Scenario B	-1.286	-2.124	-2.695	-1.920	-2.819
Scenario C	-1.473	-3.014	-3.866	-2.809	-3.935
Scenario D	-1.575	-3.763	-4.753	-3.644	-4.900
Scenario E	-0.478	0.994	1.843	0.849	0.843
Scenario F	0.090	2.554	4.650	1.845	2.296
Scenario G	0.624	4.044	7.379	2.805	3.657
Scenario H	1.163	5.518	10.100	3.772	5.034

As stated in the study's introduction, 15% of rural Afghan households receive remittances from outside, accounting for 20% of their daily expenses. Table 7 confirms a fall in household consumption except for cereals in all agricultural sectors due to a decrease in foreign remittances, but this relationship reverses when remittances increase. The study found that fruits, vegetables, livestock, and opium experienced varying percentage changes between the reducing and rising scenarios. Fruits diminished from -0.950 to -3.905, vegetables from -0.938 to -3.852, livestock from -0.946 to -3.888, and opium from -0.953 to -3.908; however, fruits, vegetables, livestock, and opium increased from 0.793 to 3.335, from 0.741 to 3.035, from 0.775 to 3.226, and from 0.803 to 3.341, respectively. Foreign remittances cut consumption, except for cereals, in all agricultural sectors. However, when remittances surge, Afghan immigrants, often from subsistence farming families, use them for other products, leading to improved consumption. This is because people consistently rely on cereals as their primary source of nutrition.

Table 7. Impact of Changes in Foreign Remittances on Household Consumption

Scenarios	Percentage change from the base value				
	Cereals	Fruits	Vegetables	Livestock	Opium
Base value	37134	57266	20792	60752	9339
Scenario A	0.000	-0.950	-0.938	-0.946	-0.953
Scenario B	0.000	-2.019	-1.986	-2.008	-2.013

Scenario C	0.000	-2.965	-2.919	-2.951	-2.966
Scenario D	0.000	-3.905	-3.852	-3.888	-3.908
Scenario E	0.000	0.793	0.741	0.775	0.803
Scenario F	0.000	1.645	1.505	1.600	1.660
Scenario G	0.000	2.487	2.265	2.410	2.495
Scenario H	0.000	3.335	3.035	3.226	3.341

The rise in remittances boosts recipients' purchasing power, leading to augmented imports. While remittances can meet short-term demands, they don't address long-term issues. The study investigates the responses of foreign remittances to agricultural sub-sectors, specifically the import of agricultural products. It revealed that in scenarios reducing remittances, the import of agricultural products decreases, except for fruits. In scenarios of increased remittances, the import of agricultural products also reduces, except for cereals and opium, as outlined in Table 8. In detail, scenario D exposed a percentage change of -10.614, -0.248, -1.302, -2.730, and -4.732 for cereals, fruits, vegetables, livestock, and opium, whereas scenario H recorded a percentage change of 6.897, -13.186, -9.466, -1.218, and 3.727, respectively. Fruit production has significantly increased in recent years due to investment and high-yielding cultivars. However, producers still face import competition from Pakistan, Iran, and China, exacerbated by improper post-harvest handling and further losses. The study's findings align with previous research suggesting that remittance inflow relaxes foreign exchange constraints, enabling the import of investment goods and promoting investment, especially in developing countries like Afghanistan, which heavily rely on imports (Bird 2016). Olubiyi (2014) also discovered that Nigeria's exports were adversely impacted, whereas its imports were positively stimulated.

Table 8: Impact of Changes in Foreign Remittances on Imports

Scenarios	Percentage change from the base value				
	Cereals	Fruits	Vegetables	Livestock	Opium
Base value	30591	14500	8758	15603	10545
Scenario A	-2.462	0.076	-0.217	-0.628	-1.091
Scenario B	-5.995	0.172	-0.434	-1.333	-2.684
Scenario C	-8.323	0.248	-0.651	-1.968	-3.755
Scenario D	-10.614	-0.248	-1.302	-2.730	-4.732
Scenario E	1.010	-2.303	-1.507	-0.032	0.645
Scenario F	2.971	-6.103	-4.225	-0.436	1.726
Scenario G	4.913	-9.703	-6.862	-0.827	2.722
Scenario H	6.897	-13.186	-9.466	-1.218	3.727

Remittances harmfully stimulate trade by affecting export performance, exchange rates, and trade balances. They also have a Dutch disease effect, potentially decreasing Africa's

competitive export performance (Amuedo Dorantes, 2014; Bourdet and Falck, 2006; Dahal, 2014). However, the results of the present study delved into the fact that reducing foreign remittance scenarios leads to lower exports across all agriculture sectors but reverses when remittance increases. The percentage change of foreign remittances gradually surges in rising scenarios while dropping in all reducing scenarios. Falling scenarios indicate faster cuts in cereal remittance volume, with scenario D reducing it by (23.369) percent, followed by scenarios C, B, and A. The remittance amount in scenario H has increased significantly compared to scenarios G, F, and E, reaching \$7.853. Also, fruits, vegetables, livestock, and opium all had considerable changes in the eight adopting scenarios; the highest and lowest percentage changes were -4.437 to 5.124, -5.114 to 10.203, -10.826 to 2.755, and -5.186 to 5.285, respectively.

Table 8: Impact of Changes in Foreign Remittances on Exports

Scenarios	Percentage change from the base value				
	Cereals	Fruits	Vegetables	Livestock	Opium
Base value	1579	16431	7998	1561	103798
Scenario A	-5.320	-1.041	-1.275	-2.627	-1.196
Scenario B	-12.540	-2.605	-2.926	-6.086	-3.012
Scenario C	-18.556	-3.627	-4.176	-8.776	-4.182
Scenario D	-23.369	-4.437	-5.114	-10.826	-5.186
Scenario E	3.420	0.907	1.888	1.537	0.843
Scenario F	5.826	2.428	4.739	2.434	2.385
Scenario G	6.840	3.786	7.464	2.562	3.826
Scenario H	7.853	5.124	10.203	2.755	5.285

Conclusion

The study delved into the impact of remittances on Afghanistan's agricultural industry, which accounts for 37% of the fiscal year's budget. It utilizes a computable general equilibrium model based on Walras' law and Biruni Institute's Social Accounting Matrix (SAM) to analyze the short-term macroeconomic impacts of foreign remittance changes in 2018. The study tested eight scenarios based on percentage changes in foreign remittances in Afghanistan, comparing actual values to a baseline scenario. The results illustrated a correlation between domestic production in agriculture sub-sectors and foreign remittance variables. Reducing foreign remittances leads to lower domestic production across all agriculture sectors, but this reverses when remittances surge. The percentage change of foreign remittance gradually increases domestic production in rising scenarios from scenario E to scenario H while diminishing from scenario A to scenario D. Contracted remittances decline prices. Still, scenarios with enhanced remittances surge the purchasing power of agricultural products, particularly cereals, which play a vital role in Afghanistan's food security. In addition, the current research shows that dropping foreign remittances leads to lower labor and capital share in all agriculture sectors, but the opposite happens when remittances swell. During decreased remittances, agricultural product imports decrease, except for fruits, while

increased remittances lead to the import of opium and cereals. The research findings delved into reducing foreign remittance scenarios leads to lower exports across all agriculture sectors but contraries remittance growth. In addition, future research could incorporate time variables into the model to investigate the effects of policy implementation on variable changes over time, especially for programs like trade liberalization. Additionally, dividing the labor force into groups based on income, skill level, or urban versus rural locations could provide more precise insights into labor dynamics and their economic impacts.

Recommendations

The research's findings lead to policy suggestions.

- The study reveals a direct link between domestic agricultural production and foreign remittances, urging the government to boost investment in the agriculture sector.
- Remittances generate significant income in recipient countries, boosting household innovation and business growth. The government should use skilled immigrants as scientific capital to benefit from many foreign-born populations.
- Dropping foreign remittances leads to lower labor and capital share in agriculture sectors while soaring remittances boost agricultural purchasing power. The study suggests encouraging migrant investors to invest in sustainable agriculture to promote sustainable consumption instead of meaningless costs.
- Policymakers may enhance their comprehension and management of the intricate interplay between macroeconomic factors, foreign remittances, and sustainable economic growth in Afghanistan by heeding these recommendations and exploring other research possibilities.

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Appendix (1)

Symbol	Definitions of index, parameter and variables
i and j	Sector indices
h	Index of primary factors of production (labor and capital)
VD_j	The added value of the j-th sector
VD_{hj}	Demand for the h-th production factor by the j-th sector
b	Efficiency parameter in the production function
β_{hj}	The share parameter of production elasticity of the j-th sector in relation to the h-th input
Y_j	The gross output of the j-th sector
X_{ij}	The production of the i-th sector, consumed as an intermediate input by the j-th sector f the j-th sector, which is consumed as an intermediate input by the i-th sector
ax_{ij}	The coefficient of the minimum need for intermediate inputs of the i-th sector in order to produce a unit output of the j-th sector
ay_j	The coefficient of the minimum need for added value of j-th sector to produce a unit of output
PN_j	The value-added price of the j-th sector
W_h	Wages of h-th factor
PS_j	The supply price of the j-th sector
PQ_i	The price of the composite product is the i-th sector
C_i	Households' consumption of goods of the i-th sector
δ_{cj}	The share parameter in the utility function
FS_h	Supply amount of h-th primary factor (exogenous variable)
TAX_{dir}	Direct tax on household income
SAV_{hoh}	Household savings
$TAX_{ind,j}$	Indirect tax (sales tax)
Tx_j	Sales tax rate
td	direct tax rate
$TARIFF_j$	Import Tariff
Tm_j	Import tariff rate

PM_i	Import price
M_j	Import amount
S_{hoh}	Household saving
S_g	Government saving
SAV_f	Foreign saving (exogenous variable)
$SANVING$	Total savings
$INVEST$	All investment
ID_i	The investment demand of the i-th sector
μ_i	The investment share parameter of the i-th sector
PE_j	Export price
Pwm_i	Global import price (exogenous variable)
Pwe_i	Global export price (exogenous variable)
EXR	Exchange rate
Q_i	Composite product
D_i	Domestic product
γ_j	Efficiency parameter in the production function of composite goods
αm_i and αd_i	Share parameters in the Armington function
ρ_{mi}	Power of the Armington function
η_i	Elasticity of Armington function
PD_i	The price of domestically produced goods
E_i	Export amount
θ_i	The efficiency parameter of the transfer function
β_{ei} and β_{di}	Share parameters in the transfer function
ρ_{ei}	The power of the transfer function
σ_j	Transmission elasticity
C_i	i th goods consumption
PQ_i	The price of goods in the i-th sector
G_j	Government expenditure in the i-th sector
HOH_y	Household income
gov_{hoh}	Government transfer payment to households

remit_{hoh} Rest of world transfer to households (remittances)
