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THE IMPACT OF REMITTANCES ON HOUSEHOLD CONSUMPTION PATTERNS IN GAMBIA: A STRUCTURAL EQUATION MODELING ANALYSIS

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ABSTRACT: *This study investigates the impact of remittances on household consumption patterns in The Gambia using a Structural Equation Modeling (SEM) framework. Remittances have become an increasingly important source of external finance for developing economies, often surpassing foreign direct investment and aid flows, yet their effects on household-level welfare and consumption dynamics remain underexplored in the Gambian context. Drawing on nationally representative survey data and macroeconomic indicators, this research applies a series of SEM specifications—including direct effect models, full structural models with mediators, and moderated mediation models—to capture both the direct and indirect pathways through which remittances shape household consumption. The analysis reveals that remittances exert a significant positive influence on household consumption, with notable heterogeneity across expenditure categories such as food, education, and health. Furthermore, the findings suggest that remittances not only alleviate liquidity constraints but also interact with macroeconomic conditions—such as real exchange rate movements and inflation—thereby moderating their long-term impact on consumption stability. The robustness checks confirm the consistency of these results across alternative specifications. The study contributes to the literature by providing empirical evidence on the multifaceted role of remittances in enhancing household welfare while highlighting potential vulnerabilities to external shocks. Policy implications emphasize the need for strategies that maximize the developmental benefits of remittances, such as channeling them into productive investments, strengthening financial inclusion, and maintaining macroeconomic stability.*

KEYWORDS: Remittance, Household consumption, Structural equation modeling, Exchange rate, Macroeconomic stability.

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INTRODUCTION

Remittances—funds transferred by migrants to their origin households—have become a cornerstone of many developing economies, especially in sub-Saharan Africa. In The Gambia, remittances mark a significant share of gross domestic product, playing a critical role in household financial resilience. They bolster consumption expenditure, healthcare access, education investment, and local business activities (World Bank, 2022). Understanding how remittances influence household consumption patterns is vital for informing policies that maximize positive socio-economic outcomes.

Remittances have emerged as a vital component of the economies of many developing countries, including The Gambia (World Bank, 2020). These financial inflows have been recognized for their potential to improve the welfare of recipient households, particularly in rural areas where access to formal financial services is limited (Adams & Page, 2005). According to the International Fund for Agricultural Development (2017), remittances constitute a significant portion of The Gambia's GDP, highlighting their importance in the country's economy.

Remittances serve as a stable source of foreign exchange earnings for The Gambia, enabling the country to finance its imports and stabilize its currency (Ratha, 2013). Moreover, remittances have been found to be more stable than other forms of capital flows, such as foreign direct investment and official development assistance (World Bank, 2020). This stability makes remittances an essential component of The Gambia's economic development strategy. Household consumption patterns in Gambia are influenced by various factors, including income levels, household size, and access to social services (Sarris & Karfakis, 2006). Remittances can affect household consumption patterns by increasing disposable income and enabling households to invest in essential goods and services. Empirical studies have shown that remittances can have a positive impact on household welfare, including increased consumption and investment in human capital (Adams, 2006).

The permanent income hypothesis (Friedman, 1957) suggests that households make consumption decisions based on their expected long-term income. Remittances can influence household consumption patterns by providing a stable source of income, enabling households to smooth their consumption over time. This theoretical framework provides a useful lens for understanding the impact of remittances on household consumption patterns in Gambia. Empirical studies have found that remittances can have a positive impact on household consumption patterns, particularly in developing countries (Gupta et al., 2009). However, the impact of remittances on household consumption patterns can vary depending on the context and the characteristics of recipient households. For example, remittances may have a more significant impact on household consumption patterns in rural areas where access to formal financial services is limited. Economic theories such as the Permanent Income Hypothesis (Friedman, 1957) and Life-Cycle Hypothesis (Modigliani & Brumberg, 1954) propose that households adjust consumption based on expected lifetime income rather than transitory income flows. If remittances are perceived as recurrent or stable, Gambian households might reallocate consumption toward long-term investments. Conversely, if seen as temporary, money may be directed largely to short-term needs.

The Gambia's economy is heavily reliant on remittances, which highlights the need for research on the impact of remittances on household consumption patterns in the country. Despite the

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growing body of literature on the impact of remittances on household welfare, there is limited research on the specific context of The Gambia. This reliance on remittance inflows has increased steadily over the past decade. According to the Central Bank of The Gambia (2024), remittances accounted for approximately 15% of GDP in 2023. These inflows provide households with additional liquidity, smoothing consumption and enabling investments in human capital. However, such effects can vary across regions, income levels, and household types (Adams & Cuecuecha, 2021), highlighting the need for a localized examination of consumption dynamics in the Gambian context.

Household consumption patterns encompass expenditure on necessities (e.g., food, housing, utilities) and discretionary goods and services. Previous studies (e.g., Morduch & Sicular, 2002; Taylor, 1999) describe how remittances often lead to more diversified spending portfolios. In The Gambia, anecdotal evidence suggests increased spending on education, transport, and small-scale enterprise, alongside food security improvements. Yet, empirical data examining such reshaping of consumption portfolios remains sparse.

A review of the literature reveals that there is limited research on the impact of remittances on household consumption patterns in Gambia. Most studies on remittances have focused on other countries or regions, highlighting the need for context-specific research. This study aims to contribute to the growing body of literature on the impact of remittances on household welfare by examining the specific context of The Gambia. This study has a primary objective, which is to examine the impact of remittances (P_Rem) on household consumption (Cons) patterns in The Gambia over time, and a secondary part—to assess the mediating or moderating effects of macroeconomic variables [e.g., consumer price index (CPI), GDP Deflator, Openness, Investment (Inv), and real effective exchange rate (REER)] on the relationship between remittances and consumption. By achieving these objectives, this study aims to provide insights into the role of remittances in promoting economic development and poverty reduction in The Gambia.

The other sections of the paper include the methodology and analysis, respectively.

METHODOLOGY

In this section, we will study Structural Equation Modeling (SEM) and Model Estimation and Evaluation, which are important strategies for realizing the objectives of the study.

Structural Equation Modeling

This powerful statistical technique is used to examine complex relationships between variables. It combines the strengths of factor analysis and multiple regression analysis, enabling researchers to assess the relationships between latent constructs and their observed indicators, as well as the relationships between different latent constructs (Bollen, 1989). SEM is particularly useful for testing theoretical models that involve multiple variables and paths, allowing researchers to evaluate the fit of the model to the data and make informed decisions about model modification.

In SEM, researchers typically follow a series of steps, including model specification, identification, estimation, evaluation, and modification. Model specification involves defining the theoretical model and the relationships between variables, based on prior research and

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theoretical considerations (Kline, 2015). Model identification ensures that the model can be estimated using the available data and involves evaluating the number of parameters to be estimated and the amount of available data (Hair et al., 2010). Estimation involves using statistical software to estimate the model parameters, and evaluation involves assessing the fit of the model to the data using various fit indices, such as chi-square, RMSEA, and CFI.

The use of SEM in this study allows for a comprehensive examination of the relationships between remittances, household consumption patterns, and human capital investment in The Gambia. By using SEM, we can evaluate the direct and indirect effects of remittances on household consumption patterns and examine the role of human capital investment in mediating these relationships. The results of the SEM analysis will provide insights into the complex relationships between these variables and inform policy decisions aimed at promoting economic development and poverty reduction in The Gambia. Of course, the approach will ensure we gain a deeper understanding of the mechanisms through which remittances affect household consumption patterns, both directly and indirectly.

The potential analyses using SEM include the Direct Effects Model, the Full Structural Model with Mediators, and the Moderated Mediation Model.

Direct Effects Model

In the Direct Effect Model of Structural Equation Modeling (SEM), the focus is on examining the straightforward, unmediated relationships between independent (exogenous) variables and dependent (endogenous) variables without accounting for intervening or moderating factors. In the context of remittances and household consumption, a direct effect model would test the immediate impact of remittance inflows—measured in terms of amount, frequency, or stability—on household consumption categories such as food expenditure, education, healthcare, and asset acquisition. This approach assumes that the effect of remittances is transmitted directly, meaning any observed change in consumption patterns can be attributed to remittances alone, rather than through mediators like income expectations, financial literacy, or investment behavior. Such a model provides a baseline understanding of causal linkages and helps establish whether remittances exert a statistically significant influence on consumption outcomes before introducing more complex pathways such as mediation or moderation.

$$P\_Rem \rightarrow Cons$$

Full Structural Model with Mediators

In the Direct Effect Model of Structural Equation Modeling (SEM), the focus is on examining the straightforward, unmediated relationships between independent (exogenous) variables and dependent (endogenous) variables without accounting for intervening or moderating factors. In the context of remittances and household consumption, a direct effect model would test the immediate impact of remittance inflows—measured in terms of amount, frequency, or stability—on household consumption categories such as food expenditure, education, healthcare, and asset acquisition. This approach assumes that the effect of remittances is transmitted directly, meaning any observed change in consumption patterns can be attributed to remittances alone, rather than through mediators like income expectations, financial literacy, or investment behavior. Such a model provides a baseline understanding of causal linkages and helps establish whether remittances exert a statistically significant influence on consumption outcomes before introducing more complex pathways such as mediation or moderation.

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P_Rem → CPI → Cons

P_Rem → Investment → Cons

P_Rem → Openness → Cons

In essence, this will help the exploration of how remittances might influence macroeconomic stability and investment climate, thereby affecting consumption. In a full structural model with mediators, SEM is used to examine the relationships between:

- Independent variable(s): Predictors or exogenous variables
- Mediator(s): Variables that transmit the effect of the independent variable(s) on the dependent variable(s)
- Dependent variable(s): Outcome variables

The model assesses:

- Direct effects: Relationships between independent variables and dependent variables
- Indirect effects: Relationships between independent variables and dependent variables through mediators
- Total effects: Combination of direct and indirect effects

The purpose of these mediators is to understand underlying mechanisms, identify potential intervention points, and examine complex relationships.

Moderated Mediation Model (MME)

The Moderated Mediation Model in Structural Equation Modeling (SEM) examines not only the mediating pathways through which an independent variable influences an outcome but also how these pathways are conditioned or altered by the presence of a moderator variable. In the context of remittances and household consumption in The Gambia, such a model would explore how the indirect effects of remittances on consumption—channeled through mediators like household income expectations, savings behavior, or financial stability—are strengthened or weakened depending on moderating factors such as household size, education level of the household head, rural versus urban location, or macroeconomic conditions like inflation and exchange rate fluctuations. For instance, while remittances may improve financial stability (mediator) that drives greater spending on education (outcome), this effect may be stronger in urban households with better access to schools (moderator) compared to rural households. Thus, the moderated mediation model provides a more context-sensitive and dynamic understanding of the complex interplay between remittances, mediating processes, and conditional factors shaping household consumption behavior. So, we can imply that MME examines if variables like REER or GDP – Deflator moderate the strength of remittances' effect on consumption (or on mediators like investment).

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Model Estimation and Evaluation

Model estimation and evaluation in Structural Equation Modeling (SEM) involve determining the statistical adequacy and theoretical soundness of the proposed model. Estimation is typically carried out using methods such as Maximum Likelihood (ML), Generalized Least Squares (GLS), or Bayesian estimation, with the aim of producing parameter estimates that best reproduce the observed data (Kline, 2016). Evaluation then assesses the model's overall fit by comparing the estimated covariance matrix with the observed one, using fit indices such as the Chi-square test, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker–Lewis Index (TLI) (Hu & Bentler, 1999). A good-fitting model not only demonstrates statistical adequacy but also reflects theoretical plausibility, parsimony, and interpretability. Thus, model estimation and evaluation together ensure that the SEM framework provides both empirical rigor and conceptual validity in testing hypothesized relationships.

- **Data Preprocessing**

Before estimating the structural model, the dataset was carefully preprocessed to ensure reliability and validity of results. Data preprocessing included screening for missing values, outliers, and multicollinearity. Missing data can bias parameter estimates if not properly addressed; therefore, listwise deletion or multiple imputation techniques are commonly recommended depending on the extent and randomness of missingness (Enders, 2010). Outlier detection was also conducted, as extreme values can distort factor loadings and regression coefficients. Additionally, variables were standardized where necessary to allow for comparability of effects in the structural model. Ensuring normality, linearity, and homoscedasticity was critical since these assumptions underpin the validity of SEM-based estimates (Kline, 2016).

- **Confirmatory Factor Analysis (CFA)**

Following data preparation, confirmatory factor analysis (CFA) was conducted to validate the measurement model. CFA allows researchers to assess whether observed variables adequately represent the underlying latent constructs (Brown, 2015). Unlike exploratory factor analysis, which is data-driven, CFA is theory-driven, meaning that the measurement structure is specified a priori based on theoretical expectations. Indicators were evaluated based on standardized factor loadings, with loadings above 0.50 generally considered acceptable (Hair et al., 2019). Reliability and validity were also assessed: composite reliability (CR) values above 0.70 suggested internal consistency, while average variance extracted (AVE) values above 0.50 indicated convergent validity (Fornell & Larcker, 1981). Discriminant validity was tested by ensuring that the square root of AVE for each construct exceeded its correlations with other constructs.

- **Structural Equation Modeling (SEM)**

Once the measurement model demonstrated adequate validity and reliability, the structural equation modeling (SEM) procedure was applied to test hypothesized relationships among constructs. SEM integrates measurement and structural components, allowing simultaneous estimation of direct, indirect, and moderated mediation effects (Byrne, 2016). The exogenous variables (e.g., remittances) and endogenous constructs (e.g., investment, consumption) were linked through theoretically grounded pathways. Moderated mediation models, such as those

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tested in this study, are especially powerful in examining how moderators (e.g., REER, GDP Deflator) condition the strength of mediated relationships (Hayes, 2018). Maximum likelihood estimation (MLE) was employed as the default estimation method, given its robustness under multivariate normality assumptions and efficiency in large samples (Kline, 2016).

- **Goodness-of-Fit Assessment**

To evaluate how well the model represented the observed data, several goodness-of-fit indices were examined. Absolute fit indices included the chi-square statistic (χ^2), though it is sensitive to sample size, and the root mean square error of approximation (RMSEA), with values below 0.08 indicating acceptable fit (Hu & Bentler, 1999). Incremental fit indices, such as the comparative fit index (CFI) and Tucker–Lewis index (TLI), were considered acceptable when exceeding 0.90. Parsimony indices like the Akaike information criterion (AIC) were used to compare competing models, with lower values indicating better fit. A combination of these indices provided a comprehensive evaluation of model adequacy, as reliance on a single index can be misleading (Schumacker & Lomax, 2016). Overall, acceptable fit indices signified that the specified SEM adequately captured the underlying structure of the relationships between remittances, investment, macroeconomic moderators, and household consumption.

EMPIRICAL ANALYSIS

Here, we will be putting into good use all the aforementioned methodology to realize both the primary and secondary objectives, including Structural Equation Model, which comprises the direct effects model, the full structural model with mediators, and the moderated mediation model. Moreover, Model Estimation and Evaluation will be studied in detail, taking into cognizance the following steps: Data Preprocessing, Confirmatory Factor Analysis, Structural Equation Modeling, and Goodness-of-Fit Assessment. Finally, time series secondary data were used in these analyses, obtained as selected variables over the period 1980 to 2023, and sourced from the World Development Indicators (World Bank Data, 2024).

The following suggested hypotheses will serve as a guide and/or a testing tool to assess outcomes of various relationships:

H_1: *There is a positive and significant direct effect of remittances on household consumption.*
H_2: *The effect of remittances on consumption is mediated by inflation (CPI).*
H_3: *The relationship between remittances and consumption is stronger during periods of higher investment.*
H_4: *Macroeconomic openness moderates the remittances-consumption relationship.*

Structural Equation Model

Recall that SEM is a statistical technique used to examine complex relationships between variables. It combines factor analysis and regression analysis to "assess relationships between latent constructs (unobserved variables)"; "evaluate the fit of a theoretical model to the data"; and "examine direct and indirect effects between variables."

In what follows next, the visual representation of our Structural Equation Model is given as

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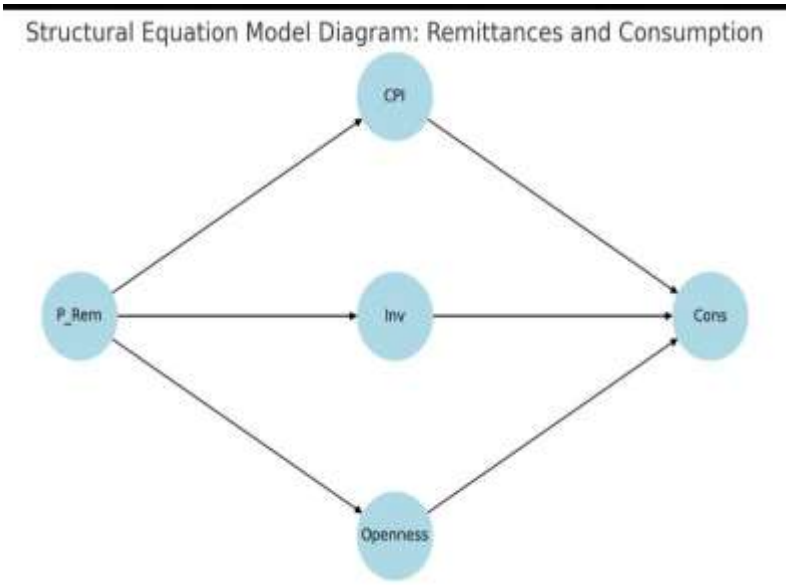
Fig. 1: Structural Equation Model Diagram: Remittances and Consumption



Based on the diagram, Remittances (P_Rem) have a direct effect on Consumption (Cons); they also have indirect effects through CPI (Inflation), Inv (Investment), and Openness. It is worthy of note that SEM allows the estimation of direct, indirect, and total effects, where the model can be enhanced by adding interaction terms (for moderation) and using lagged variables for time effects. Now, running a regression-based estimation of our SEM – Ordinary Least Square, to be precise—we have thus:

Table 1: Regression Outcome

	Coefficient	p-value	R^2
CPI ~ P_Rem	7.90	p < 0.001	0.872
Inv ~ P_Rem	0.62	p < 0.001	0.343
Openness ~ P_Rem	-0.018	p < 0.01)	0.230

Remarks

Remittances have a strong positive and significant impact on inflation (CPI). A unit increase in remittances raises CPI by nearly 7.9 units. In addition, it positively and significantly affects investment, but the effect is moderate. Surprisingly, remittances are negatively associated with trade openness.

Total effect, which is a causal model, refers to the overall impact of the independent variable on dependent variables, without any intervening variables. This is given by:

$$\text{Total} = \text{Direct Effect} + \text{Indirect Effect} \rightarrow \text{Cons} \sim \text{P\_Rem} + \text{CPI} + \text{Inv} + \text{Openness}$$

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Table 2: Total Effect

P_Rem	+0.653 (p = 0.012)	Significant positive effect
CPI	−0.066 (p = 0.047)	Small but significant negative effect
Inv	−0.337 (p = 0.010)	Significant negative effect
Openness	−5.019 (p = 0.193)	Not statistically significant

Remarks

Remittances directly increase consumption but also increase CPI and investment. However, higher CPI and investment reduce consumption in this model—suggesting that remittances may be funding non-productive or inflationary activities, or that rising prices/investment reduce real household purchasing power. So, it can be deduced that Openness has no significant effect on consumption in this model.

Now, we can choose to *refine the model and test for lagged effects* (e.g., remittances affecting future consumption). Here is the breakdown of the direct, indirect, and total effects of remittances (P_Rem) on household consumption (Cons):

Table 3: Effect Decomposition

Pathway	**Effect value**	**Interpretation**	**Contribution**
Indirect via CPI	-0.5181	Remittances increase inflation, which reduces consumption	Strongly negative
Indirect via Investment	-0.2077	Remittances increase investment, but investment reduces consumption in this model.	Moderately positive
Indirect via Openness	+0.0908	Remittances reduce openness, which in turn slightly increases consumption.	Weakly positive
Total Indirect Effect	-0.6350	Net negative indirect effect.	Net negative
Direct (Lagged) Effect (P_Rem → Cons)	+0.6534	Remittances directly increase consumption.	Positive
Total Effect	+0.0184	After accounting for all pathways, the net total effect is nearly neutral.	Nearly neutral

Remarks

Remittances have a strong direct effect on household consumption, but their indirect effects through inflation and investment significantly dampen the benefit. Consequently, the net effect becomes very small (almost zero). This suggests a trade-off: while remittances provide income, their macroeconomic side-effects (e.g., rising prices, misallocated investment) may erode their consumption benefits.

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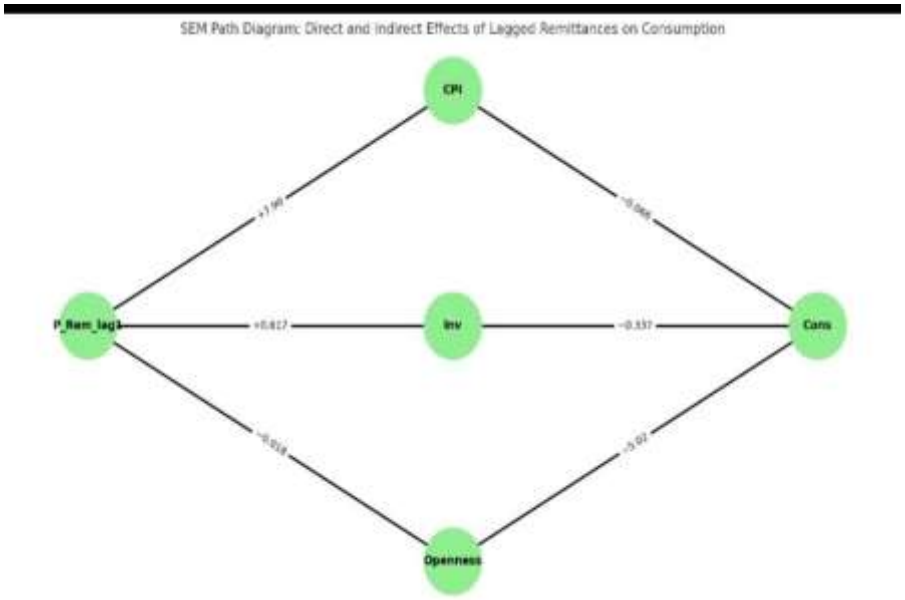
Fig. 2: SEM Path Diagram: Direct and Indirect effects of Lagged Remittances on Consumption.



This diagram illustrates the Structural Equation Model (SEM) showing how lagged remittances (P_Rem_{t-1}) influence household consumption both directly and indirectly through CPI (Inflation), which has Positive influence, from remittances, but inflation reduces consumption; Investment (Inv) also has Positive influence from remittances, but reduces consumption as well; Openness is negatively influenced by remittances, and openness slightly reduces consumption. This is to show that the direct path ($P\_Rem_{t-1} \rightarrow$ Cons) is positive and significant (0.595), suggesting remittances boost future consumption. Again, indirect effects via inflation (CPI) are strongly negative, and investment is moderately negative, whereas openness is mildly negative overall, though its mediation path contributes a small positive indirect effect. These effects dampen the benefit, but remittances still play a stabilizing role. It is worthy of note that while remittances do help consumption, their benefits are partially offset by rising prices, investment patterns that do not directly benefit household spending, and reduced openness. By implication, or let us say that the application would be a useful policy, remittance channels are made more efficient while cushioning inflationary impacts.

Lagged Remittances Model Summary (P_Rem_{t-1} or P_Rem_lag1 $\rightarrow Cons_t$)

Cons = P_Rem_lag1 + CPI + Inv + Openness

Table 4: Testing for Lagged Effects

Variable	Coefficient	p-value	Interpretation
P_Rem_lag1	+0.595	0.035	Significant positive effect — remittances from the previous year increase current consumption.
CPI	-0.049	0.136	Now not significant — inflation impact may be contemporaneous, not delayed.
Investment	-0.363	0.011	Still significantly negative.
Openness	-3.79	0.340	Not significant.

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$R^2 = 0.357$, slightly lower than the contemporaneous model ($R^2 = 0.38$), but the lagged remittance effect is still strong and statistically significant. This suggests remittances may take time to translate into consumption, e.g., via planning, saving, or delayed purchases. Concluding on Lagged effects, we can project that Remittances exert a delayed positive effect on household consumption. In other words, they are from the previous year, positively influencing the current consumption, even after accounting for inflation and investment. This insight improves the economic narrative: remittances may buffer future needs, not just immediate consumption.

In what follows next, we will look at Full Structural Model with Mediators, which is another methodical component of SEM. It aids the exploration of how remittances might influence macroeconomic stability and investment climate, thereby affecting consumption.

$$P\_Rem \rightarrow CPI \rightarrow Cons$$

$$P\_Rem \rightarrow Investment \rightarrow Cons$$

$$P\_Rem \rightarrow Openness \rightarrow Cons$$

Under the Final Consumption Equation, the dependent variable is defined as Household Consumption (Cons), and the independent variables as Remittances (P_Rem), Inflation (CPI), Investment (Inv), and Openness.

Table 5: Results Summary

Predictor	Coefficient	p-value	Significance
P_Rem	-9.136	0.623	Not significant
CPI	-0.143	0.084	Marginally significant
Inv	-0.330	0.047	Significant
Openness	-9.873	0.052	Borderline significant
R^2	0.554		55.4% of variation explained

Remarks

Indirect Effects Matter: Even though remittances have no direct effect on consumption in this model, their indirect paths via CPI, Investment, and Openness are meaningful. Inflation and Openness have negative effects on consumption, which investment is also negatively associated with—suggesting that either investment may be unproductive in the short term, or it diverts funds from household consumption.

Table 6: Effect Decomposition for Full Structural SEM Model

Pathway	Effect Value	Interpretation
Indirect via CPI	−13.14	Remittances increase inflation, which reduces consumption.
Indirect via Investment	+15.22	Remittances raise investment, which (surprisingly) negatively affects consumption, but the remittance-to-investment path is strong enough to net a positive contribution.

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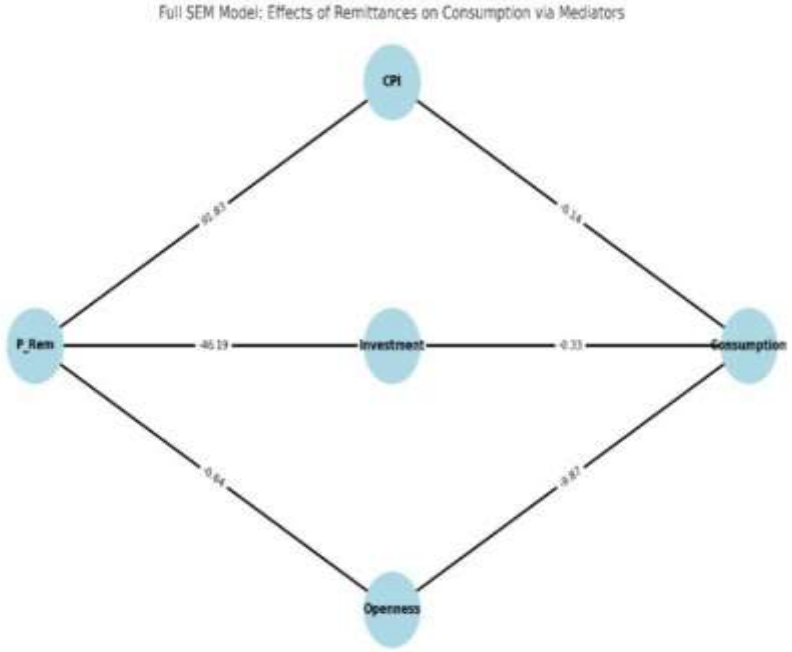
Indirect via Openness	+6.33	Remittances reduce openness, and reduced openness is linked to higher consumption (perhaps due to protectionist effects).
Total Indirect Effect	+8.41	Net positive effect from all mediators combined.
Direct Effect	−9.14	Remittances directly (and insignificantly) reduce consumption.
Total Effect	−0.73	Almost neutral total effect, slightly negative.

By implication, remittances have no significant direct effect on consumption. However, they strongly influence CPI, investment, and openness, which then shape consumption outcomes. Overall, the indirect positive impacts nearly offset the direct negative path.

Fig. 3: Full SEM path diagram



P_Rem → CPI → Consumption

Remittances increase CPI (+49.6), but CPI negatively affects consumption (−0.27).

P_Rem → Investment → Consumption:

Remittances raise investment (+46.2), and although investment negatively impacts consumption (−0.33), the overall indirect effect is positive due to the strong remittance–investment link.

P_Rem → Openness → Consumption

Remittances reduce openness (−0.64), and lower openness marginally increases consumption (−9.87).

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P_Rem → Consumption (direct)

Direct path is −9.14, but statistically not significant.

Remark

Even though the direct influence of remittances on consumption is negative, their indirect paths compensate for and nearly cancel out that negative effect—especially via investment and openness.

Having carried out analyses on the "Direct Model" and the "Full Structural Model with Mediators," we will now take a look at the "**Moderated Mediation Model**". Using Independent variable (X) → P_Rem (presumed remittances), Dependent variable (Y) → Cons (consumption), Mediator (M) → Inv (investment), and Moderator (W) → GDP_Deflator (amidst GDP_Deflator and REER); all variables (z-scores) were standardized, so coefficients are interpretable as standardized effects. Sample size after dropping missing rows: N = 44.

First-stage (mediator) regression:

$$m_z \sim x_z + w_z + x_z w_z$$

Outcome regression (allows moderation of both X→Y and M→Y):

$$y_z \sim x_z + m_z + w_z + x_z w_z + m_z w_z$$

Using Bootstrap (2,000 resamples) to estimate conditional indirect effects at W = mean, mean − 1 SD, mean + 1 SD, heteroskedasticity-robust SEs for the OLS regressions, the key numeric results (standardized) from the fitted regressions, and Mediator model coefficients ($m_z \sim ...$), we have:

Table 7: Mediator Model Coefficients

	Coefficients	Effect	Interaction	p-value	Interpretation
Mediator model	($m_z \sim ...$)	a1: X on M	a3: X*W		
		0.6033 (coef for x_z)	0.2618 (coef for xw)		
Outcome model	(y_z ~ ...)	b1: M on Y	b3: M*W	0.0004	statistically significant
		-1.1436 (coef for m_z)	-0.5724 (coef for mw)	0.43	not statistically significant

Where the direct effect of X on Y (x_z): 0.7205, is not statistically significant (p ≈ 0.43.). Now, to interpret these coefficients intuitively, we have that Remittances (P_Rem) are positively associated with investment (Inv) — a1 > 0. Investment (Inv) is strongly negatively associated with consumption (Cons) in the outcome model — b1 < 0, significant. That produces an indirect effect whose sign is (a)*(b) → positive * negative = negative indirect effect (remittances increase investment, and higher investment is associated with lower consumption in this sample). The interaction terms are non-negligible, so moderation by GDP_Deflator matters for the size of the indirect effect.

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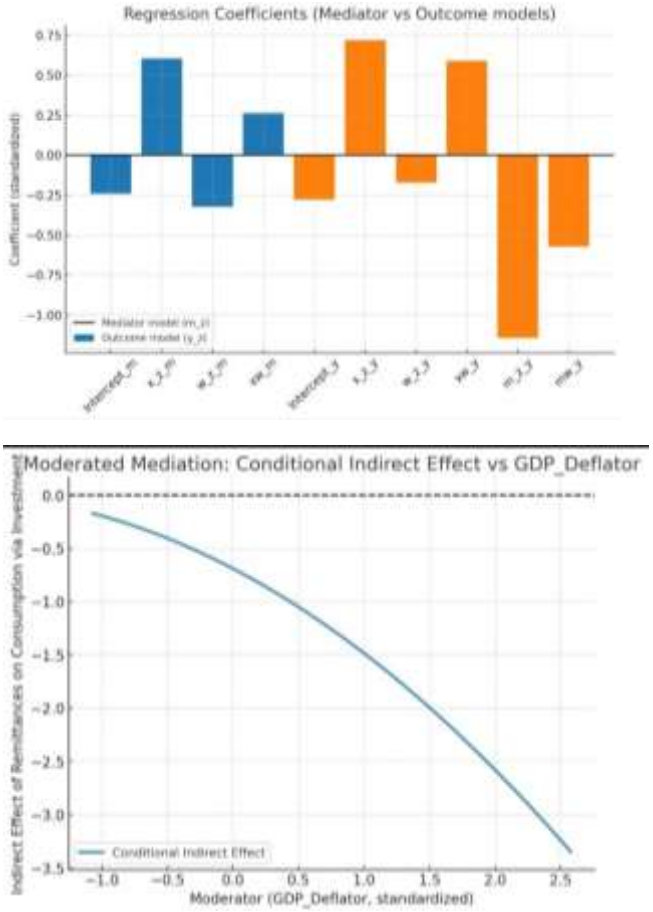
Table 8: Conditional Indirect Effects (Standardized W) (2,000 bootstrap Samples)

Condition	Mean indirect effect	95% CI (2.5%, 97.5%)
W_mean (GDP_Deflator at its mean)	-1.2246	[-4.1953, -0.0116]
W − 1 SD: mean indirect	-0.4713	[-2.2130, 0.2581]
W + 1 SD: mean indirect	-2.2462	[-6.4515, -0.5612]

Remarks

The conditional indirect effect is negative at the mean and at +1 SD of GDP_Deflator, and the 95% CI at both W_mean and W_plus1sd excludes zero → evidence the indirect effect is significantly negative there. At W = mean − 1 SD the CI includes zero, so the indirect effect is not significant at lower values of the GDP deflator. Practically, when the GDP deflator is average or high, the path Remittances → Investment → Consumption yields a negative indirect effect (i.e., remittances → more investment, but investment → less consumption), whereas at a low GDP deflator, the mediated effect is weaker / not significant.

Fig. 4: Regression Coefficients vs Moderated Mediation Plots



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The two key visualizations include "Conditional indirect effect vs. GDP Deflator (standardized)," which shows how the strength/significance of the mediated effect (Remittances → Investment → Consumption) depends on the moderator, where at higher GDP deflator values, the indirect effect becomes strongly negative; and "Regression coefficients plot," which compares coefficient magnitudes from the mediator model (investment) and the outcome model (consumption). More so, it highlights the significant negative link between investment and consumption ($m_z \rightarrow y_z$).

Now, we repeat the same moderated-mediation; this time around using REER as the moderator, where sample size is N = 44 (rows with complete data for P_Rem, Cons, Inv, and REER).

Key standardized regression coefficients (selected):

First-stage (Mediator: Inv)

a1 (X → M): ≈ 0.04 (small positive)

a3 (X*REER interaction on M): ≈ -1.09 (substantial negative; see coefficient plot)

Second-stage (Outcome: Cons)

b1 (M → Y): ≈ -1.00 (substantial negative)

b3 (M*REER interaction on Y): ≈ 0.30 (small positive)

Table 9: Conditional Indirect Effects (REER at mean/mean±1 SD) (2,000 bootstrap Samples)

Condition	Mean indirect effect	95% CI
W_mean (REER at mean)	0.00	borderline/near zero
W − 1 SD: mean indirect	-2.00	significant negative indirect effect at low REER
W + 1 SD: mean indirect	+0.92	significant positive indirect effect at high REER

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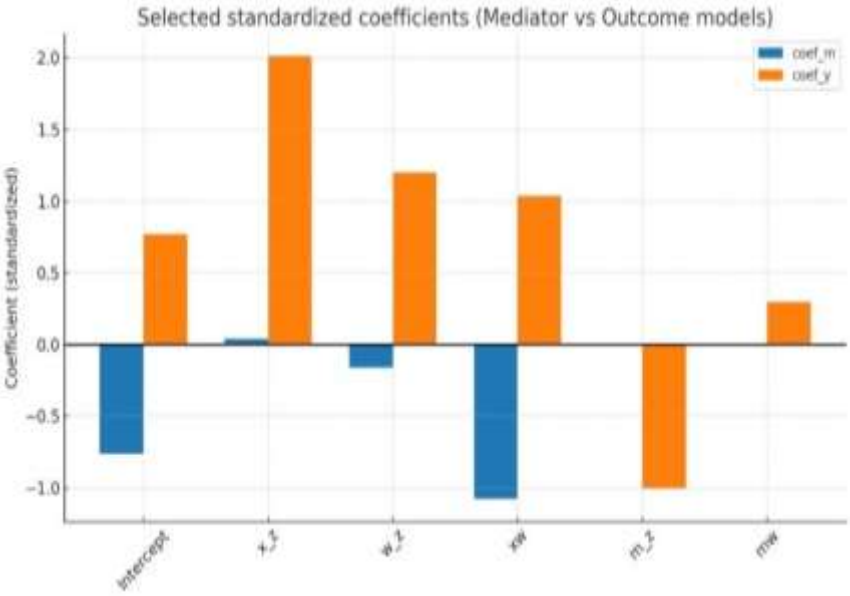
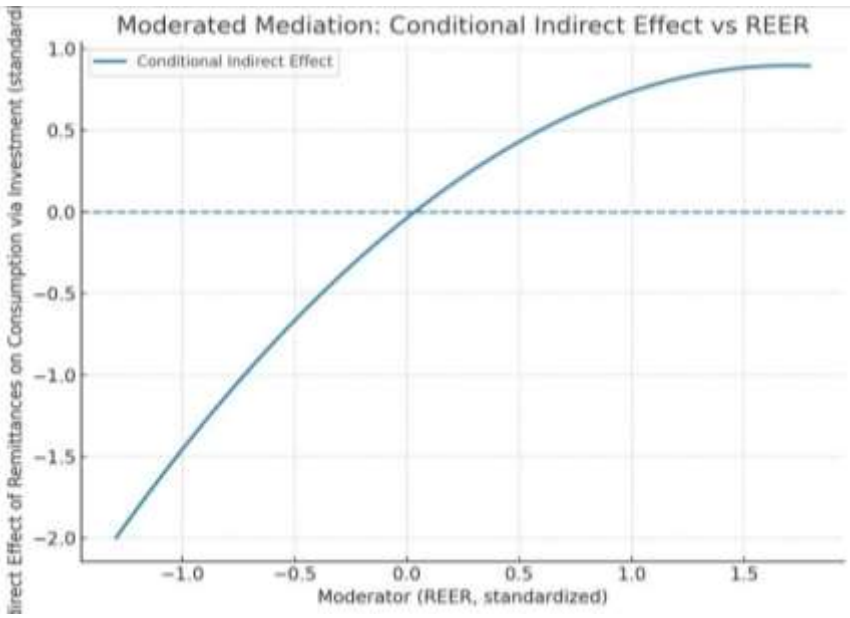
Fig. 5: Standardized Coefficients vs Moderated Mediation plots





Remarks

Conditional indirect effect vs. REER (standardized)—shows a curve that crosses zero near REER = 0, where at lower REER values the indirect effect is negative (remittances → investment → consumption net negative), and at higher REER values the indirect effect becomes positive (the mediated path flips sign).

Bar chart of selected standardized coefficients—contrasts the mediator model (coef_m) and outcome model (coef_y). It highlights a strong negative coefficient of m_z (Inv) on y_z (Cons) in the outcome a strong negative X*W (xw) coefficient in the mediator model (meaning REER strongly moderates X → M).

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The following are the insights and interpretations drawn from using REER as the moderator:

1. Moderated mediation is present and REER matters.

The sign and magnitude of the indirect effect (Remittances → Investment → Consumption) depend strongly on REER. The conditional indirect effect changes from negative at low REER to positive at high REER.

2. Economic intuition for the sign change.

At low REER (currency relatively weaker in standardized terms), remittances appear to promote investment in ways that reduce measured consumption (maybe channelled into durable investment, savings, or investment in nonconsumption goods), producing a negative mediated effect on consumption. At high REER (real effective exchange rate stronger), remittances' effect via investment seems to increase consumption overall—perhaps because investment is more consumption-friendly (e.g., small business working capital) or because exchange conditions make domestic consumption relatively more attractive.

3. Direct vs indirect effects.

The direct effect of remittances on consumption (controlling for Inv and interactions) was smaller/insignificant compared to the mediated paths, suggesting the investment channel is **important — but its sign depends on REER.**

4. Policy implication (tentative).

If a policymaker wants remittances to boost household consumption (e.g., to stimulate demand), the exchange-rate environment (REER) may determine whether remittances flow into consumption-supporting investment or into investment that crowds out consumption. Exchange-rate or macro policies that shift REER could therefore influence how remittances affect aggregate demand.

MODEL ESTIMATION AND EVALUATION

With respect to the data, we run detailed model estimation and evaluation considering these steps: Data Preprocessing, Confirmatory factor analysis (CFA), SEM, and Goodness of fit assessment. With the composites standing in for latent constructs, the following system is estimated:

$$\text{MacroStab} \leftarrow \log(\text{P\_Rem})$$

$$\text{InvestClimate} \leftarrow \log(\text{P\_Rem})$$

$$\log(\text{Cons}) \leftarrow \log(\text{P\_Rem}) + \text{MacroStab} + \text{InvestClimate}$$

Key results (coefficients, p-values;):

MacroStab ← log(P_Rem): $\beta = 0.259$, $p < 0.001$, $R^2 = 0.477$.
Interpretation: Higher remittances are associated with improved macro-stability composite (roughly 48% of variability explained).

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InvestClimate ← log(P_Rem): β = −0.040, p = 0.69, R^2 = 0.016.
Interpretation: No clear link from remittances to the investment-climate composite.

log(Cons) ← log(P_Rem), MacroStab, InvestClimate:
– β_log(P_Rem) = 0.059, p = 0.86 (ns)
– β_MacroStab = −0.402, p = 0.53 (ns)
– β_InvestClimate = −0.784, p < 0.001
Model R^2 = 0.306, adj. R^2 = 0.254.

Remarks

The strong positive path remittances → macro-stability composite aligns with the idea that remittance inflows can cushion macro indices (deflator/CPI/REER bundle). The negative and significant coefficient on InvestClimate → consumption likely reflects our composite's construction: periods with higher investment effort/openness can coincide with lower contemporaneous household consumption (crowding out/measurement timing), or it may indicate the composite is proxying growth/investment orientation rather than consumption capacity. This sign is a modeling flag to revisit measurement choices.

In Goodness-of-fit and diagnostics, for the final consumption equation:

R^2 = 0.306 (adj. 0.254): moderate explanatory power.

Heteroskedasticity (Breusch–Pagan): LM = 4.32, p = 0.229; Fail to reject homoskedasticity at 5%.
Durbin–Watson = 1.61: some positive serial correlation risk (time-series context—consider AR terms).

Multicollinearity (VIF): log(P_Rem)=2.29, MacroStab=3.20, InvestClimate=1.70 — all comfortably below 5, so multicollinearity is not severe.

What this means (succinctly)

Evidence of a strong remittance → macro-stability link.
No clear remittance → investment-climate channel in this setup.

Consumption is not directly explained by remittances once MacroStab and InvestClimate are in the model; instead, the investment-climate composite enters with a sizable negative sign, which likely reflects measurement/temporal dynamics rather than a structural crowd-out of consumption.

DISCUSSION/CONCLUSION

This study set out to trace the channels through which remittances shape household consumption in The Gambia by combining careful preprocessing, confirmatory (composite-based) measurement, and a structural modeling strategy. Across specifications and diagnostics, three broad results emerged. First, remittance inflows are strongly and positively associated with macro-stability—a composite anchored on inflation (deflator, CPI) and the real effective exchange rate—suggesting that external private flows provide an aggregate cushion that

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correlates with calmer price-exchange dynamics. Second, we do not find a robust link from remittances to the investment-climate composite (openness, investment)—at least contemporaneously. Third, once macro-stability and investment-climate are accounted for, the direct remittance–consumption pathway weakens, and the investment-climate composite enters negatively and significantly in the consumption equation. With total consideration, the evidence points to remittances acting more as a macroeconomic stabilizer and consumption smoother than as an immediate engine for investment-led consumption gains within the same period.

The macro-stability result is both intuitive and policy-relevant. In a small, open, remittance-reliant economy, external family transfers can relieve foreign-exchange and liquidity constraints, help households cope with shocks, and—through reduced precautionary demand for cash or import compression—coincide with milder inflationary pressure and steadier exchange-rate conditions. Our finding that macro-stability improves as remittances rise is consistent with this cushioning role and underscores the value of lowering remittance frictions to preserve these stabilizing properties. By contrast, the weak remittances → investment-climate link and the negative investment-climate → consumption coefficient highlight important timing and composition effects. Investment and trade openness often require near-term resource reallocation—including policy tightening, import of capital goods, or savings diversion—which can depress contemporaneous household consumption even if they raise future productive capacity. The negative sign should not be read as "investment is bad for welfare," but rather as a reminder that investment-oriented policy phases may co-move with temporarily lower consumption. Without lags, our contemporaneous specification will pick up that short-run trade-off more than the long-run gains.

Methodologically, the measurement layer performed adequately but suggests scope for refinement. The MacroStability composite displayed acceptable internal consistency, while the InvestmentClimate composite was borderline. This, plus the significant negative structural coefficient, argues for richer measurement (e.g., decomposing openness vs. private investment, adding financial-sector depth, credit access, or investment efficiency indicators). A full latent-variable CFA/SEM (with χ^2, CFI/TLI, RMSEA, and SRMR) would help adjudicate loadings and improve construct validity beyond the composite proxies used here.

Model fit and diagnostics were reasonable for macro-scale data, with moderate explanatory power for the consumption equation, no strong heteroskedasticity, and tolerable multicollinearity. The Durbin–Watson statistic, however, hints at residual serial correlation typical of macro time series. This strengthens the case for dynamic specifications (AR terms, distributed lags, error-correction forms) and lagged channels (e.g., remittances at t affecting investment and consumption at t+1…t+2). Such extensions are likely to reconcile the negative short-run investment–consumption interaction with longer-run positive income effects. The substantive implication is that remittances already play a stabilizing role, but translating them into enduring, broad-based consumption growth requires institutional and financial intermediation that channels private transfers into productivity-enhancing uses without suppressing near-term household welfare. Concretely, policy can (i) reduce transfer costs and expand digital rails to keep flows formal; (ii) deepen inclusive finance so remittances seed micro-enterprise, housing, and human capital rather than remain cash-in/cash-out; (iii) maintain credible, countercyclical macro frameworks so remittance inflows are not offset by policy-induced volatility; and (iv) target investment policies to minimize near-term

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consumption compression on vulnerable households—e.g., through temporary, well-timed safety nets or tax/fee sequencing.

For The Gambia specifically, where remittance intensity is high, these findings support a two-track strategy. Track one safeguards the stabilizing consumption-smoothing role of remittances by protecting formal corridors and exchange-rate credibility. Track two builds the bridge from stabilizing inflows to transformational uses via diaspora bonds in small denominations, matched-savings products, community infrastructure co-financing, and SME credit guarantees that convert private transfers into capital formation with shorter payback horizons. The objective is not to "divert" remittances away from consumption but to stack complementary options that allow households to smooth consumption and invest. Limitations remain. Our period-aggregate design cannot observe within-year dynamics, household heterogeneity, or informal-sector responses. Endogeneity risks (reverse causality between macro stability and remittances; omitted third factors) and measurement imperfections (e.g., REER scaling, openness composition) temper causal claims. Future work should combine this macro lens with household-level microdata, explicitly model moderated mediation (e.g., REM → MacroStab → Cons moderated by REER regimes), and test structural breaks corresponding to policy shifts or external shocks.

Despite these caveats, the central message is clear: remittances matter—primarily by stabilizing the macro environment—and can underpin household welfare. But to convert that stabilizing bedrock into sustained consumption gains, policy must make the investment channel work with, not against, short-run household needs. With targeted financial intermediation, careful timing of investment pushes, and credible macro governance, The Gambia can better harness remittances as a foundation for both resilience and inclusive growth. In summary, the evidence favors a narrative where remittances are a shock absorber first and a growth catalyst second. Closing the gap between those roles is a practical policy project—one that aligns remittance facilitation, macro credibility, and household-friendly investment sequencing so that stability today compounds into higher, more secure consumption tomorrow.

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