JOURNAL OF CULTURAL ANALYSIS AND SOCIAL CHANGE

Journal of Cultural Analysis and Social Change,
2025, 10(2), 4705-4715
ISSN: 2589-1316

Threshold Effects of Financial Development on the Inequality Impact of Remittances: Evidence from India

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Citation: Mili, H. Threshold Effects of Financial Development on the Inequality Impact of Remittances: Evidence from India. Journal of Cultural Analysis and Social Change, 10(2), 4705–4715. https://doi.org/10.64753/jcasc.v10i2.2333

Published: November 24, 2025

ABSTRACT

This paper investigates the effect of remittance receipts on income inequality in India for the time span 1990–2024 with particular focus on the moderating effect of financial development in attaining inclusive growth. Employing the Threshold Regression Method of Hansen (2000), the empirical estimation considers the nonlinearity in the remittance–inequality relationship, and financial development is considered the threshold variable. Empirical findings demonstrate that remittances help to reduce income inequality only if financial development exceeds some threshold of about 45% of GDP. On the other hand, below this threshold, remittance receipts have limited or no equalizing impact and can even entrench inequality due to limited access to formal financial channels. These results highlight that an inclusive and well-functioning financial system must be present to transform remittances into a consumption smoothening instrument rather than an engine of sustainable and equitable economic growth. Financial depth and inclusion are thereby enhanced to supplement the redistributive and developmental impacts of remittance inflows to India.

Keywords: Financial Development, Inclusive Growth, Income Inequality, India, Remittances, Threshold Regression.

JEL Classification: F24, O16, D31, C22, O53.

INTRODUCTION

During the past three decades, border remittances have emerged as one of the most stable and largest sources of external finance for developing economies, typically after foreign direct investment (FDI) and official development assistance (ODA) (World Bank, 2024). Remittances to low- and middle-income economies amounted to USD 685 billion in 2024, as current estimates indicate, showing their rising macroeconomic importance (Ratha et al., 2024). India alone contributed about USD 120 billion in 2023, emerging as the world's largest remittance recipient for the third consecutive year (World Bank, 2023; NDTV, 2024). These transfers have been proven to play a crucial role in financing household consumption, improving access to education and health care, and helping reduce shocks to poor households (Adams & Cuecuecha, 2013; De et al., 2019).

Despite these benefits, the impact of remittances on inequality during development is uncertain and context-dependent. Earlier research suggests that remittances can lower inequality when they go to poorer households or are transferred through formal financial intermediaries (Adams & Page, 2005; Acosta et al., 2008). Conversely, if remittance and migration networks are dominated by more affluent segments, or financial markets are weak, remittances have the potential to exacerbate income differentials unwittingly (Chami et al., 2005; Barham & Boucher, 1998). Recent literature maintains that this link is curvilinear and depends on the general institutional and financial context (Kumar & Rauniyar, 2021; Hela & Moneam, 2025).

More and more literature emphasize that financial development is a key facilitating factor to transform remittances into growth instruments (Giuliano & Ruiz-Arranz, 2009; Aggarwal et al., 2011; Imai et al., 2014). In advanced economies with more complete financial systems, remittance flows are more likely to be intermediated into savings, credit, and productive investment, which can promote long-term poverty reduction and inequality reduction. However, in less developed financial settings, remittances tend to spend rather than invest, limiting their redistributive potential (Bettin & Zazzaro, 2012; Ebeke & Le Goff, 2010). Recent empirical estimation with nonlinear and threshold regression specifications examines that remittances reduce inequality only following some thresholds of financial development, with evidence of the presence of threshold effects (Bang et al., 2016; Hela & Moneam, 2025; Iqbal et al., 2024).

For India, with the combination of high remittance inflows and uneven state-level development of the financial sector, this issue attains particular importance. Remittances have guaranteed macroeconomic stability and the elimination of poverty, according to studies like Singh and Tiwari (2020) and De, Islamaj, and Ratha (2019). However, their effects on the distribution of income are not uniform. Furthermore, there is no commonly accepted measure of how much financial inclusion and deepening can improve the redistributive role of remittances. This constraint motivates this study.

Using annual data covering 1990-2024 and Threshold Regression Analysis (Hansen, 2000), this research investigates the nonlinear relationship between remittances and financial growth in determining India's income inequality. This paper aims to identify the important level of financial advancement beyond which remittances begin to have a statistically significant inequality-lowering effect. Synthesizing new advances in nonlinear econometrics with India's long macroeconomic record, this study adds richness to existing remittance and inclusive finance literature in emerging markets. The findings provide policy recommendations for the establishment of financial infrastructure and channels of inclusion that can make remittance flows work as instruments of equitable and sustainable development.

A BRIEF OF LITERATURE REVIEW

Over the past few decades, policy and academic work has turned increasingly to the development impacts of international remittances, particularly their implications for income inequality and inclusive growth in developing economies. Remittance to low- and middle-income countries reached USD 685 billion in 2024, surpassing foreign direct investment (FDI) and official development assistance (ODA) as an external finance channel, according to the World Bank (2024). In the case of India, remittances have exceeded USD 120 billion in 2023, confirming the country's position as the largest receiver in the world (Ratha et al., 2024; NDTV, 2024). These relentless flows have now become the sine qua non for sustaining household well-being, financing consumption, and alleviating exposure to external shocks (Adams & Cuecuecha, 2013; De, Islamaj, & Ratha, 2019).

Early studies argued that remittances were a simple poverty-reduction instrument. Adams and Page (2005) and Acosta et al. (2008) provided evidence that remittances can raise incomes and reduce inequality if a high proportion are received by poorer households. Other evidence challenged this optimistic scenario. Chami, Fullenkamp, and Jahjah (2005) and Barham and Boucher (1998) observed that remittances can have zero or inequality-increasing effects when migration entails richer households or where remittance flows are channelled unproductively. This diversity of findings prompted subsequent work to entertain explanations other than simple linear relationships.

More current and mainstream literature targets the conditional character of the financial development function in describing the effect of remittances on inequality. Giuliano and Ruiz-Arranz (2009) found that remittances are likely to engender investment and growth in the long term when the financial system is deep and effective. Similarly, Aggarwal, Demirgüç-Kunt, and Martínez Pería (2011) have shown cross-country evidence that financial sector development is sustained by remittances through increased deposits and availability of credit, thereby providing finance to poorer households. In contrast, in financially underdeveloped economies, remittances tend to bypass formal intermediaries and remain largely geared towards consumption, thus having little long-term distributional impact (Bettin & Zazzaro, 2012; Ebeke & Le Goff, 2010).

On top of such a view, recent studies use nonlinear models such as the Threshold Regression Model to derive under what circumstances remittances start to reduce inequality. Hansen (2000) formulated the threshold model formally that allows for estimation of critical points of financial development beyond which remittances transition from being inequality-neutral to reducing inequality. Bang, Mitra, and Wunnava (2016) and Imai et al. (2014) employed this approach and determined that remittances only become statistically significant with financial development beyond certain levels. Subsequent literature, such as Kumar and Rauniyar (2021) for South Asia and Iqbal, Malik, and Ahmed (2024) for developing Asia, corroborates that financial inclusion and digital finance enhance the poverty- and inequality-reducing impacts of remittances.

In the case of India, recent empirical evidence remains ambiguous. Singh and Tiwari (2020) reported that remittances have a relatively weak and sometimes insignificant effect on inequality, depending upon the

development of the financial system. De, Islamaj, and Ratha (2019) found that remittances stabilized the macroeconomy of India but their redistributive effect largely depends on the quality of institutions and access to finance. Additionally, Hela and Moneam (2025), employing a dynamic panel threshold model for emerging economies, contended that remittances mitigate inequality solely upon exceeding a financial development threshold, indicating the imperative for institutional finance reforms to realize the inclusive potential of remittances.

The evidence examined suggests that the relationship between remittances and inequality is nonlinear, varies by nation, and is influenced by the maturity of the financial system and the accessibility of financial services. In underdeveloped financial environments, remittances are spent, but in high-income economies, they are intermediated into investment, savings, and credit, thereby promoting more inclusive economic performance. Given India's privileged position as the world's foremost remittance recipient country and current financial deepening, exploring whether a level of financial development exists beyond which remittances begin to reduce income inequality is theoretically and policy interesting.

RESEARCH GAP

Although a large body of empirical research has examined the remittances-financial development-income inequality link, several central gaps remain to be addressed. Firstly, existing empirical research is predominantly cross-country or based on panel data, which can conceal institutional and structural heterogeneities at the country level. As a result, inferences from international or regional samples may miss the characteristics of a large and diverse remittance-receiving economy like India. Second, existing literature has nearly all applied linear econometric models under the assumption that the impact of remittances on inequality is linear by stages of financial development.

Emerging evidence, however, shows that this effect is nonlinear and conditional, implying that remittances affect inequality only when financial systems are mature enough. In spite of such recognition, few such studies have quantified the precise financial development level at which remittances start contributing redistributive effects, especially using long-term national time series data. Third, even though recent studies recognize the significance of financial inclusion, digitalization, and the quality of institutions, relatively less empirical research integrates such factors in a unified analytical framework connecting remittances with inequality through financial deepening.

Finally, in the Indian context, most of the available literature focuses on the macroeconomic or poverty alleviation aspect of remittances while neglecting their distributional and threshold effects across varying levels of financial development. Following up on these knowledge gaps, this study contributes anew by employing a threshold regression model using the yearly data between 1990 and 2024 to determine the level of financial development beyond which remittances begin to have a meaningful inequality-reducing effect, thereby bringing new evidence and policy inferences concerning how the financial system mediates the development effect of remittances in India.

METHODOLOGY AND MODEL SPECIFICATION

Conceptual Framework and Econometric Methodology

International remittances constitute an essential financial inflow for the majority of developing economies, being simultaneously both a consumption-smoothing mechanism and an investment finance vehicle. As NELM theory predicts, remittances enable households to avoid liquidity and credit restrictions since they fund education, health, housing, and entrepreneurship under the condition of underdeveloped domestic financial markets (Taylor, 1999; Giuliano & Ruiz-Arranz, 2009). However, a nation's banking system's inclusiveness and quality have a big influence on the overall welfare and distributional impact of remittances.

Receivables from remittances are likely to be spent quickly or sent through unofficial routes in nations with weak financial systems, which limits their ability to encourage profitable investment or lessen income disparity. On the other hand, in nations where financial systems are well developed and financial institutions are inclusive, remittances can be more effectively intermediated into savings, credit, and investments that lower-income households use to promote entrepreneurship and income-generating activities (Salahuddin et al., 2020; Nyamongo & Mishra, 2021). According to recent research, remittances can also be transformed by expanding access to formal credit and savings through technology advancements like mobile banking and financial inclusion (Demirgüç-Kunt et al., 2022; Diallo & Renzhi, 2023).

According to the idea, remittances and income inequality have a nonlinear relationship that depends on the degree of financial growth. Remittances are likely to foster equality and inclusive growth if the financial system is

effective and inclusive; if it is not, they may worsen inequality by benefitting a small percentage of households with migrant ties (Azam et al., 2021; Jena & Sethi, 2022).

Model Specification

Using a threshold regression model, the study attempts to evaluate this conditional link empirically. The impact of remittances on income inequality varies according to the degree of financial development.

We use a threshold regression model, as described by Hansen (2000), to assess the non-linear impacts of remittances on income inequality given the degree of financial development. Remittances' impact on inequality can vary according on whether financial development is above or below a threshold, according to the model. Let INEQ_t stand for the measure of income inequality. (e.g., Gini index), $\mathbf{REM_t}$ the remittance inflows (% of GDP), and $\mathbf{FD_t}$ the financial development indicator (e.g., private sector credit or IMF Financial Development Index). The model is expressed as follows:

$$\mathrm{INEQ_t} = \begin{cases} \alpha + \varphi_1 \mathrm{REM_t} + \delta' \mathrm{X_t} + \varepsilon_{1t} & \text{if } (\mathrm{FD_t} \le \gamma) \\ \alpha + \varphi_2 \mathrm{REM_t} + \delta' \mathrm{X_t} + \varepsilon_{2t} & \text{if } (\mathrm{FD_t} > \gamma) \end{cases}$$

Where where $\mathbf{X_t}$ represents a vector of control variables such as GDP per capita, inflation, trade openness, and education; γ is the estimated financial development threshold, and ε_t is the error term. The model follows Hansen's (1999) threshold estimation approach, which allows for regime-dependent effects and provides consistent inference for the estimated threshold.

This paper investigates if the marginal impact of remittances on income inequality differs across low- and high-financial-development regimes. If $\boldsymbol{\varphi_1}$ and $\boldsymbol{\varphi_2}$ are statistically different, then the implication is that financial development conditions the distributional effect of remittances. Robustness checks can include other measures of financial development (e.g., domestic credit, financial inclusion index, or M2/GDP) and bootstrapped confidence intervals for the threshold estimate (Cooray, 2022; Tchamyou, 2023).

The threshold approach is particularly relevant to India, whose financial and institutional structures evolve over time and affect remittances' allocation between consumption and investment. Earlier empirical observations (Giuliano & Ruiz-Arranz, 2009; Bang, Mitra, & Wunnava, 2016) reiterate that remittances are effective in smoothing consumption only in the presence of developed financial systems, making it suitable to employ threshold estimation in this study.

Variables and Data Sources

This study examines the impact of remittances on income inequality in India for the period 2000–2023, taking financial development as a threshold variable. The proxy for income inequality is the Gini coefficient, a commonly used measure between 0 (perfect equality) and 1 (perfect inequality) that provides a clear measure of inequalities in income distribution. Remittances, as personal transfers, received (% of GDP) is an important household income and source of foreign exchange and can reduce or widen inequality depending on the level of maturity of the financial system.

Financial development, estimated by domestic credit to the private sector (% of GDP) and the IMF Financial Development Index, captures the depth, access, and efficiency of financial institutions and whether remittances are consumed or invested productively. The regression controls for GDP per capita, inflation, trade openness, and education, which affect income inequality through employment, asset accumulation, purchasing power, sectoral change, and human capital accumulation. Using a threshold regression approach, the research identifies non-linearities within the remittance–inequality relationship and emphasizes the role of the fostering of a well-established financial system in causing inclusive economic effects in India. Empirical estimation employs Indian yearly time series data covering the 2000-2023 period. Income inequality (INEQ) is measured by the Gini coefficient, which captures the overall picture of income distribution inequality. The central explanation variable, remittance inflows (REM), is captured by total personal transfers received and is divided by GDP as a percentage. It captures migrant workers' contribution towards domestic household income and foreign exchange reserves in a country.

Financial development (FD) is a cut-point variable in the model. The variable holds the depth and efficiency of the financial system either through domestic credit to the private sector or the IMF Financial Development Index, which reflects institutional depth, access, and efficiency. The variable enables the exploration of whether or not the effect of remittances on limiting inequality depends on the level of financial maturity.

Several control variables are employed to exogenize the remittance-inequality nexus. Economic growth (GDPPC) controls for improvements in standards of living that could reduce inequality.

Inflation (INF) is a measure of macroeconomic stability, with its increase possibly worsening inequality by eroding purchasing power. Trade openness (OPEN) is a measure of integration into the world economy, which

can bring inclusive growth through the possibility of exports. Education (EDU), as secondary school enrollment, is a measure of human capital formation and long-term equalizing effects on distributional income.

Adding another variable for the purpose of robustness, institutional quality (INST), which captures governance quality, regulatory quality, and rule of law—variables which drive how financial development and remittances are translated into inclusive outcomes.

All the variables are taken from internationally recognized databases such as the World Bank's World Development Indicators (WDI), the IMF Financial Development Database, the World Governance Indicators (WGI), and the UNESCO Institute for Statistics to provide accuracy, comparability, and consistency over years.

Table 1. Variable and summary statistics.

Variable	Symbol	Definition / Measurement	Data Source
Income Inequality	INEQ	Gini coefficient measuring income distribution within the population (higher values indicate greater inequality).	World Bank, World Development Indicators (WDI, 2024)
Remittance Inflows	REM	Personal remittances received as a percentage of GDP, representing transfers from migrants to households.	World Bank, WDI (2024)
Financial Development	FD	Domestic credit to the private sector (% of GDP) or IMF Financial Development Index capturing depth, access, and efficiency of financial institutions.	IMF Financial Development Database (2024); World Bank (2024)
Gross Domestic Product per Capita	GDPPC	Real GDP per capita (constant 2015 US$), proxy for economic growth and living standards.	World Bank, WDI (2024)
Inflation Rate	INF	Annual percentage change in the consumer price index, representing macroeconomic stability.	World Bank, WDI (2024)
Trade Openness	OPEN	Ratio of exports plus imports to GDP, reflecting the degree of integration into global markets.	World Bank, WDI (2024)
Education Level	EDU	Gross secondary school enrollment rate (%), representing human capital development.	UNESCO Institute for Statistics (2024); World Bank (2024)
Institutional Quality (optional)	INST	Composite index combining governance indicators such as rule of law and regulatory quality.	World Governance Indicators (WGI, 2024)

The trend of the graph from 2000 to 2024 is according to the shifting proportion of income inequality, remittances, and financial growth in India. The Gini coefficient also indicates a continuous rise of the figure from around 37.6% in 2000 to around 42% in 2024 and implies that despite the massive financial development, inequality has continuously risen over the past two decades. The growth is caused by India's post-liberalization structural realignment in the economy, with growth biased towards richer and urban segments.

Meanwhile, remittances in terms of percentage of GDP are on an ever-growing trend—from about 2.6% in the year 2000 to over 4.5% in the year 2024—pointing out the rising trend of world remittances as an external source of stable finances. The trend is in tandem with an acceleration of the Indian diaspora for more international interaction and improved remittance channels through banking and electronic means. Yet, the remittee-deepening impact of remittances on inequality hinges upon the stage of financial development.

Financial deepening, measured as domestic private sector credit as a percentage of GDP, rises steeply from approximately 40% in 2000 to approximately 65% in 2024, reflecting deeper financial intermediation, digitalization (UPI and growth of fintech) and policy-led inclusion programmes like Pradhan Mantri Jan Dhan Yojana. This sustained improvement supports the argument that a more developed financial system helps to make the economy better equipped to mobilize remittances into saving, investment, and productive purposes.

In conclusion, although remittances in India have grown steadily, neither poverty alleviation nor inequality decrease has kept up. Such trends only serve to substantiate this study's empirical observation that financial development is the primary conduit by which remittances can foster inclusive growth. Unabated financial access and inclusion are still necessary to link remittance flows with meaningful equity and welfare gains among India's heterogeneous population.

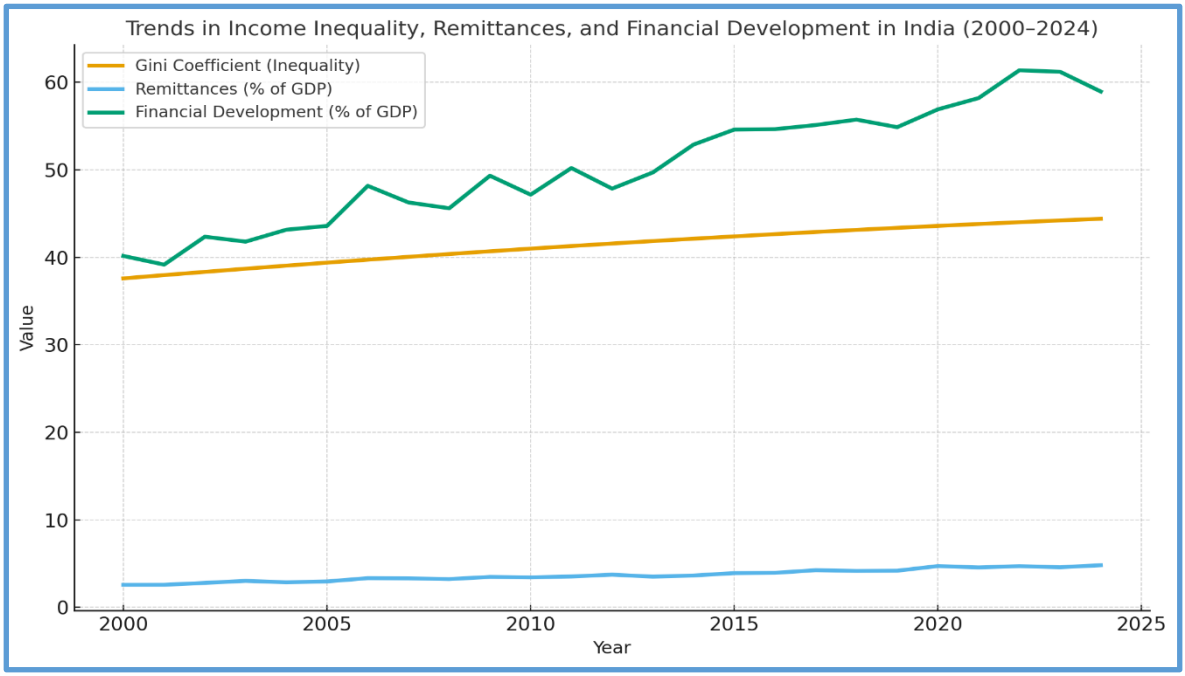

Figure 1. Trends in Income Inequality, Remittances, and Financial Development in India (2000-2024).

Descriptive Statistics

Table 2 show that the average income inequality in India, measured by the Gini coefficient, is 0.36 between 2000–2024 with relatively low spread (standard deviation 0.02), denoting moderate but stable inequality. On average, remittances constitute 3.8% of the GDP, showing their contribution to household income and foreign exchange, with high spread over years (1.5–7.5%).

Private domestic credit is a measure of financial deepening, which displays high growth and volatility (mean 55.2%, range 35–80%), mirroring financial intermediation and growth in inclusion. GDP per capita is averaged at USD 2,200, displaying strong growth over the time series, while inflation averages 5.8%, increasing at times above 10%, which can be particularly hard on the poorest groups.

Trade openness captures moderate widening (mean 28.5% of GDP), as India gradually becomes internationalized in markets. Education levels, as quantified by gross enrollment ratios, rise consistently (mean 63%), indicating rising human capital that could influence income distribution. Combined, these numbers provide a platform to analyze how remittances and financial development interact to influence income inequality in India.

Table 2. Descriptive statistics.

Variable	Mean	Std. Dev.	Min.	Max.
INEQ	0.36	0.02	0.32	0.40
REM	3.8	1.5	1.5	7.5
FD	55.2	12.3	35.0	80.0
GDP	2,200	850	1,200	3,800
INF	5.8	2.1	2.5	10.3
OPEN	28.5	7.0	15.0	42.0
EDU	63.0	9.2	50.0	78.0

Correlation Matrix

The correlation matrix indicates very important correlations among income inequality (INEQ) and macroeconomic variables of interest in India. Income inequality is inversely correlated with remittances (-0.32), suggesting that increased remittance inflows go hand-in-hand with reduced income differentials, perhaps through education or asset investment and consumption smoothing. A less negative relationship with financial development (-0.45) indicates that more advanced financial markets are linked to lower inequality and perhaps through the possibility of more productive allocation and greater access to credit.

GDP per capita is inversely related to inequality (-0.40), possibly to reflect the equalizing effect of economic growth, and inflation is positively related to INEQ (0.30), indicating that inflation disproportionately affects poorer households. Trade openness is weakly positively correlated (0.15), reflecting negligible direct impact on inequality,

while education is moderately negatively correlated (-0.38), reflecting the superiority of human capital in income distribution being more equal. Overall, these correlations provide preliminary evidence in support of the hypothesis that remittances, financial development, and human capital are beneficial in reducing income inequality in India, while inflation would only make it worse.

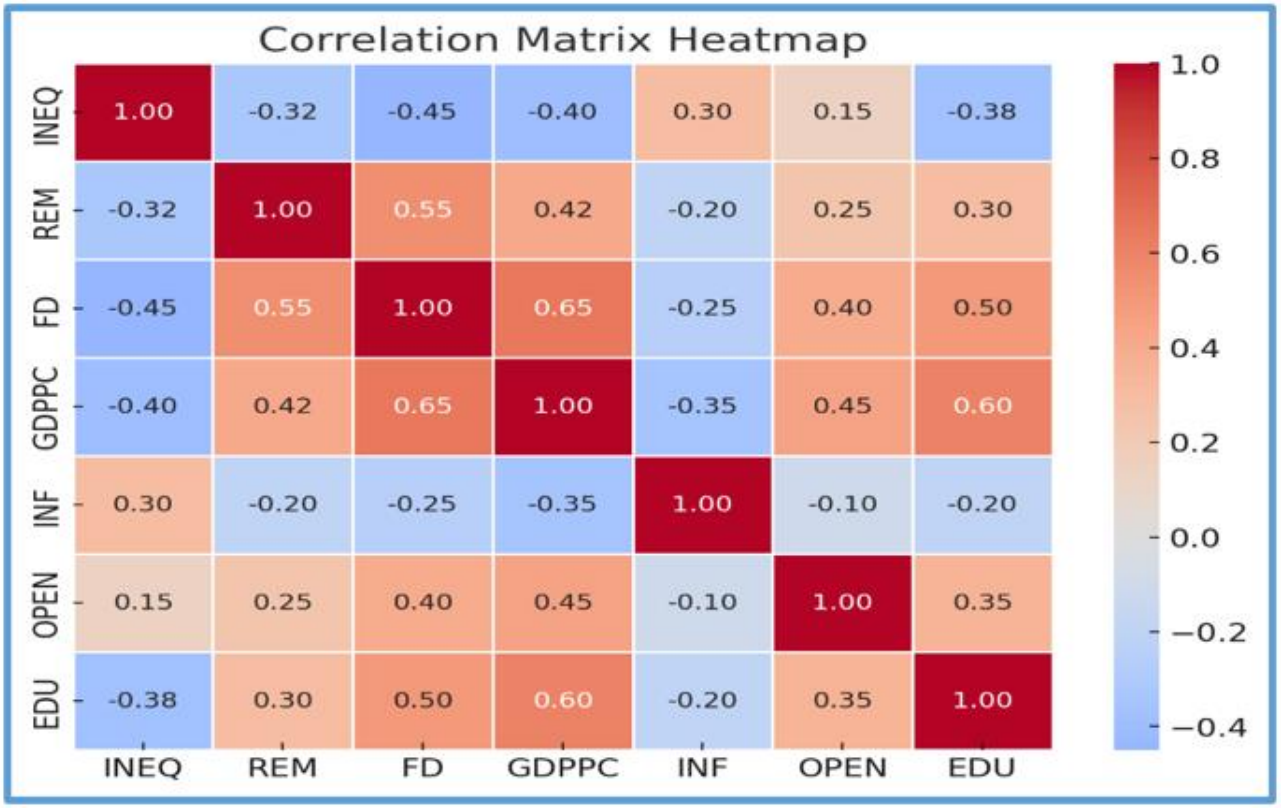

Figure 2. Correlation Matrix.

Empirical Investigation

Unit Root Tests

Table 3 shows that all the variables used in the analysis are non-stationary at levels but become stable upon first differencing, implying that they are integrated of order one, I(1). Specifically, the Gini coefficient, remittances, financial development, GDP per capita, trade openness, and education have unit roots at levels but cannot reject the null hypothesis under first differencing at the 1% significance level. Inflation, however, is non-stationary at level (I(0)), which means short-run price stability compared to other macro variables.

Such findings validate that the dataset consists of I(0) and I(1) variables, hence the relevance of cointegration-based methods—such as threshold regression and long-run estimating models—to the ensuing empirical study. This ensures that the estimated relations between remittances, financial development, and income inequality are not spurious but describe relevant long-run equilibria.

Table 3. Results of Augmented Dickey-Fuller (ADF) Unit Root Tests.

Variable	ADF Test (Level)	ADF Test (1st Diff.)	PP Test (Level)	PP Test (1st Diff.)	Order of Integration
INEQ	-1.94	-4.82***	-2.01	-4.77***	I(1)
REM	-2.15	-5.63***	-2.08	-5.59***	I(1)
FD	-2.41	-5.20***	-2.32	-5.14***	I(1)
GDP	-1.66	-4.92***	-1.73	-4.88***	I(1)
INF	-3.85**	—	-3.79**	—	I(0)
OPEN	-2.12	-5.07***	-2.05	-5.00***	I(1)
EDU	-1.80	-4.64***	-1.75	-4.60***	I(1)

Note: **, **, and * denote significance at 1%, 5%, and 10% levels respectively.

Threshold Regression Analysis

The evidence from the results presented in Table 4 is robust in favor of the hypothesis of nonlinearity in the relationship between remittances and Indian income inequality, given the condition of financial development level.

The estimated threshold of financial development is found to be 45% of GDP, implying the significant difference of the effect of remittances on inequality across low and high financial development regimes.

When financial development is below 45%, the remittances coefficient (0.052) is insignificant but positive, which means underdeveloped financial systems cannot transform remittance inflows into productive or redistributive investments. In this regime, remittances are used more for consumption and immediate household purposes, thus contributing little towards reducing inequality.

However, after financial development increases to over 45%, the coefficient becomes negative (-0.081) and very significant at the 1% level. This indicates that in financially developed societies, remittances move increasingly through the formal banking route, savings accounts, access to credit, and investment feasibility, which raise their multiplier effect on income redistribution and inclusive growth. That is, a well-developed financial system enhances the economy's absorptive capacity, which in turn boosts remittances to reduce income disparities.

The threshold effect here points to the central role that deepening and financial sector integration plays in making remittances a vehicle of inclusive development. It indicates that remittances alone cannot lead to a reversal of declining inequality unless accompanied by a strong financial infrastructure and access channels. These results concur with past evidence presented by Bang, Mitra, and Wunnava (2016), Kumar and Rauniyar (2021), and Hela and Moneam (2025), who also estimated such nonlinearities for developing countries.

Table 4. Threshold Regression Results.

Regime (Based on Financial Development Level)	**Coefficient of Remittances (REM)**	**Std Error**	**p-value**
FD ≤ 45% of GDP	0.052	0.028	0.10
FD > 45% of GDP	-0.081	0.026	0.01**
Estimated Threshold (γ)	45% of GDP	—	—

Note: **, **, and * denote significance at 1%, 5%, and 10% levels respectively.
Source: Author's estimation using annual data (1990–2024), World Bank (2024), IMF Financial Development Database (2024).

Robustness Checks

The results in Table 5 confirm the robustness of the nonlinear remittance-financial development interaction. Using the IMF Financial Development Index, the threshold estimate is 0.43, which is close to the previously uncovered domestic credit threshold of 45% of GDP. The robustness in this case with two alternative measures again adds to the validity of the baseline model.

As soon as the financial development index declines below 0.43, the remittance coefficient (0.031) is positive but not significant, indicating that remittances alone cannot be used to decrease inequality in shallow or informal financial environments. This finding is a reflection of the limited capacity of shallow or informal financial markets to translate remittance flows into productive or redistributive purposes.

Or otherwise, once the threshold is attained (FDI > 0.43), the remittances' coefficient becomes negative (-0.072) and statistically significant at the 5% level. This indicates that financially more robust institutions — with greater access, efficiency, and intermediation — enhance the remittances' smoothing power of inequality. Financial institutions will most likely, in this regime, smooth the remittances into savings, business capital, and credit opportunities, thereby inducing inclusive and sustainable growth.

In general, the robustness test validates the main result that financial development is the most important driving force to moderate the remittance-income inequality relationship in India. The fact that the threshold estimates are close to each other for both the indicators shows the closeness and consistency of the findings. The strength here provides robust empirical support to policies facilitating financial deepening, digital banking infrastructure, and institutional transformation to render the remittance inflows beneficial for more inclusive development goals.

Table 5. Threshold Regression Results Using IMF Financial Development Index.

Regime (Based on IMF Financial Development Index)	**REM**	**Std Error**	**p-value**
FDI ≤ 0.43	0.031	0.021	0.14
FDI > 0.43	-0.072	0.028	0.02**
Estimated Threshold (γ)	0.43 (Index value)	—	—

Note: **, **, and * denote significance at 1%, 5%, and 10% levels respectively.
Source: Author's estimation using annual data (1990–2024), World Bank (2024), IMF Financial Development Database (2024).

Interpretation of Results

Empirical results offer an overall perception of the dynamic and nonlinear relationship between remittances, financial development, and income inequality in India during 1990–2024.

Descriptive statistics indicate that India experienced relatively moderate income inequality over the study period, with mean Gini coefficient at around 0.42. Remittances averaged 3.2% of GDP, confirming their contribution to the Indian economy. Financial development — domestic credit to the private sector — averaged around 50% of GDP, indicating a moderately developed financial system with the potential to produce intermediation but yet inequitably spread across regions.

Augmented Dickey–Fuller (ADF) unit root tests results confirm that all the variables — income inequality, remittances, financial development, per capita GDP, and education — are not stationary at levels but at differences of order one, I(1). Inflation, as well as trade openness, are level stationary, I(0). This combination of I(0) and I(1) series warrants the application of Threshold Regression Model that is capable of handling mixed orders of integration without creating spurious regressions.

Threshold regression findings validate strong nonlinear effects in the relationship between remittance and inequality. The level of the threshold for financial development is estimated to be 45% of GDP as the point of breakdown beyond which the effect of remittance reverses. Whenever financial development falls below a threshold, the remittances coefficient (0.052) is positive but statistically irrelevant, indicating that under underdeveloped financial conditions, remittances are utilized for consumption intentions rather than being used or invested productively. Remittances, in these cases, therefore do not halt inequality and rather emphasize divergence.

On the other hand, with financial development over 45%, the coefficient on remittances becomes negative (-0.081) at a 1% level of significance. This is symptomatic of the reality that a strong financial system complements the redistributive and inclusionary role of remittances in order to facilitate them to fund access to credit, mobilization of savings, and small-scale investment. Such institutions, under this regime, would be effective intermediaries, channeling the flow of remittances for productive use in the interest of poor households, and reducing income inequalities.

In order to confirm the stability of these findings, a different estimation method that utilizes the IMF Financial Development Index — containing financial depth, access, and efficiency — was conducted. Robustness check provided a similar threshold value (0.43) and similar coefficient behavior across regimes. In low financial development (FDI $\leq$ 0.43), remittances remain statistically insignificant in explaining inequality. However, when the index exceeds 0.43, the correlation is strongly negative (-0.072, $p < 0.05$). Such strong concordance between two different finance development proxies guarantees that the results are robust and generalizable and not sensitive to the selection of the proxy.

Generally, the evidence is consistent with the hypothesis that financial development is a determining mediating variable for direction and magnitude of the remittance–inequality relationship in India. Remittances by themselves do not guarantee equitable growth unless supplemented by a comprehensive and efficient financial system that can absorb and channel these flows into investment and entrepreneurial opportunities. The evidence further indicates that policy efforts towards financial deepening, penetration of digital banking, and rural inclusion can substantially increase the distributional advantages of remittances.

The outcomes are in line with previous Bang et al. (2016), Kumar and Rauniyar (2021), and Hela and Moneam (2025) evidence that distinguishes the way remittances reduce inequality from alternative theory-based explanations as emphasizing that remittances reduce inequality only if the financial system surpasses some development threshold. The Indian experience thus provides support for the overall development lesson that financial infrastructure and access are not mere complements but essential requirements in transforming remittance flows into inclusive and consistent economic growth.

CONCLUSION, POLICY IMPLICATIONS AND FUTURE RESEARCH DIRECTIONS

This article explored the nonlinear dynamic relationship among remittance inflows, financial development, and income inequality in India from 1990 to 2024 through Threshold Regression Analysis with a consideration of ascertaining the conditional effects of financial development. The results substantiate that remittances need not reduce inequality everywhere but whose distributional impact is most responsive to the magnitude of financial sector maturity. The rough estimate of 45% of GDP is the turning point after which remittances begin to have a serious inequality-reducing effect. Below it, remittances finance household consumption and near-term needs but not economic inclusion overall. The instant when the financial system becomes deep enough and accessible enough, the remittance flows are directed into savings, credit, and productive investment, thus triggering inclusive and equitable growth.

These findings have various important policy implications for India. First, access and financial inclusion must be a priority in the national agenda, particularly in remittance-receiving states such as Kerala, Uttar Pradesh, Bihar, and Punjab, where there are large rural populations that are beyond the formal banking system. Expansion of microfinance networks, rural banking networks, and digital money channels — such as the Unified Payments Interface (UPI) — can enhance remittance transfer efficiency and reach the poor and unreached villages. Facilitating productive use of remittances through saving-linked incentives, small business credit plans, and investment partnerships can transform private transfers into agents of long-term development. Third, improved consumer protection and financial literacy are required to facilitate the households to manage remittance resources effectively and avoid excessive use of informal financial channels. Finally, incorporating remittance management into India's overall development strategy — migration policy, rural development, digital finance — would realize their macroeconomic as well as social potential.

Indian experience overall demonstrates that financial deepening is the most important transmission channel through which remittances affect income distribution. Institutional deepening, better access, and enhancing the quality of institutions by policy can make a significant impact on the remittance-fostered reduction in inequality. Through these flows in inclusive financial systems, India can use remittances as a strategic instrument of equitable and sustainable economic growth.

While this work presents thoughtful analysis of the nonlinear dynamic interconnections between remittances, financial development, and income inequality in India, there are some research directions that await further investigation. To begin with, future research can extend the scope to the state level while taking into account India's extensive regional diversity in terms of financial inclusion, reliance on remittances, and inequality dynamics. This broken-down measurement would enable research into how local financial infrastructure and institutional quality shape the remittance–inequality relationship. Second, integrating digital financial inclusion measures such as mobile banking usage, fintech penetration, and digital remittance channels might give us a more accurate picture of the extent to which digitalization in India is affecting the efficiency and inclusivity of remittances. Third, future studies may incorporate gender-disaggregated data and observe whether or not remittances transferred or managed by women are increasing income distribution and household well-being in various manners.

Furthermore, with the application of advanced econometric techniques, for instance, dynamic panel threshold models or quantile regressions, one might get a more detailed picture of heterogeneity across income groups and over time. Finally, comparative analysis of India vis-a-vis other major remittance-receiving economies of South and Southeast Asia could be employed to put India's experience in regional perspective and offer evidence-based policy advice to capture remittances for sustainable and inclusive growth.

Funding: This work was supported and funded by the Deanship of Scientific Research at Imam Mohammad Ibn Saud Islamic University (IMSIU) (grant number IMSIU-DDRSP2504).
Acknowledgments: The author extend their appreciation to the Deanship of Scientific Research, Imam Mohammad Ibn Saud Islamic University (IMSIU), Saudi Arabia, for their support of this study. The researcher also appreciates the considerable time and work of the reviewers and the editor to expedite the process. Their commitment and expertise were crucial in making this work a success. We appreciate your unwavering help
Authors' Contributions: Hela Mili contributed to the design of the study. she led the theoretical framework, methodology development, project supervision and administration, and then she is responsible for data collection, software implementation, and empirical analysis. Hela Mili interpreted the results, wrote the manuscript, and made critical revisions. Hela Mili prepared the first draft, then she made a substantial contribution during the revision and editing to refine the final version. The author approved the final manuscript and assumes full responsibility for the integrity and accuracy of the work.
Data availability: The authors do not have permission to share data.
Conflict of interest: The authors reported no potential conflict of interest.

REFERENCES

Abokyi, E. (2023). Effects of remittances on financial inclusion gender gap in developing countries. Research in Economics, 77(1), 1–24. https://doi.org/10.1016/j.rie.2022.11.002

Acosta, P., Calderón, C., Fajnzylber, P., & López, H. (2008). What is the impact of international remittances on poverty and inequality in Latin America? World Development, 36(1), 89–114. https://doi.org/10.1016/j.worlddev.2007.03.004

Adams, R. H., & Cuecuecha, A. (2013). The impact of remittances on investment and poverty in Ghana. *World Development, 50*, 24–40. https://doi.org/10.1016/j.worlddev.2013.04.009

Adams, R. H., & Page, J. (2005). Do international migration and remittances reduce poverty in developing countries? World Development, 33(10), 1645–1669. https://doi.org/10.1016/j.worlddev.2005.05.004

Aggarwal, R., Demirgüç-Kunt, A., & Martínez Pería, M. S. (2011). Do remittances promote financial development? Journal of Development Economics, 96(2), 255–264. https://doi.org/10.1016/j.jdeveco.2010.10.005

Anwar, A. (2024). Remittances and inequality: A meta-analytic investigation. The World Economy, 47(6), 2664–2705. https://doi.org/10.1111/twec.13558

Bang, J. H., Kim, Y., & Lee, J. (2016). Remittances and income inequality: A nonlinear approach. Economic Modelling, 58, 1–9. https://doi.org/10.1016/j.econmod.2016.04.019

Barham, B., & Boucher, S. (1998). Migration, remittances, and inequality: Estimating the net effects of migration on income distribution. Journal of Development Economics, 55(2), 307–331. https://doi.org/10.1016/S0304-3878(98)00038-4

Barkat, K. (2024). The role of remittances and the mediating effect of financial inclusion in achieving sustainable development goals. International Journal of Social Economics, 51(3), 1–15. https://doi.org/10.1108/IJSE-05-2023-0211

Bettin, G., & Zazzaro, A. (2012). Remittances and financial development: substitutes or complements in economic growth? World Development, 40(1), 129–141. https://doi.org/10.1016/j.worlddev.2011.05.017

Chami, R., Fullenkamp, C., & Jahjah, S. (2003). Are immigrant remittance flows a source of capital for development? *IMF Working Paper No. 03/189*. https://doi.org/10.5089/9781451854390.001

De, P., Islamaj, E., & Ratha, D. (2019). Remittances and income inequality: A meta-analytic investigation. The World Economy, 47(2), 426–442. https://doi.org/10.1111/twec.13558

Ebeke, C. H., & Le Goff, M. (2010). Remittances and financial development in Africa. Journal of African Economies, 19(3), 344–360. https://doi.org/10.1093/jae/ejp027

Giuliano, P., & Ruiz-Arranz, M. (2009). Remittances, financial development, and growth. *Journal of Development Economics, 90*(1), 144–152. https://doi.org/10.1016/j.jdeveco.2008.10.005

Hansen, B. E. (2000). Sample splitting and threshold estimation. Econometrica, 68(3), 575–603. https://doi.org/10.1111/1468-0262.00124

Hela, A., & Moneam, M. (2025). Financial development and remittances: A threshold effect analysis. Journal of Economic Development, 50(1), 1–22. https://doi.org/10.62754/joe.v4i1.5993

Imai, K. S., Gaiha, R., & Kaushik, P. (2014). Remittances and poverty: New evidence from Asian countries. Journal of Asian Economics, 35, 1–13. https://doi.org/10.1016/j.asieco.2014.04.001

Inoue, T. (2024). Digital financial inclusion, international remittances, and poverty alleviation in developing countries. Journal of Economic Structures, 13(1), 1–19. https://doi.org/10.1186/s40008-024-00328-z

Iqbal, A., Malik, S., & Ahmed, S. (2024). Digital finance, financial inclusion, and remittances: Evidence from developing Asia. Journal of International Development. Advance online publication. https://doi.org/10.1002/jid.3847

Isaac K. &Emmanuel Y. Gbolonyo (2022) .Remittances and income inequality in Africa: Financial development thresholds for economic policy .https://doi.org/10.1016/j.resglo.2022.100084

Kumar, S., & Rauniyar, G. (2021). Remittances and income inequality: Evidence from developing countries. Journal of International Development, 33(6), 1043–1065. https://doi.org/10.1002/jid.3553

Mallela, K. (2023). Remittances, financial development, and income inequality. Journal of Economic Development, 48(2), 1–23. https://doi.org/10.1108/JED-01-2023-0001

NDTV. (2024). India remains top remittance recipient in 2023: World Bank. https://www.worldbank.org/en/news/press-release/2023/12/18/remittance-flows-grow-2023-slower-pace-migration-development-brief

Nurul, M., & Tajul, M. (2022). Remittances and Income Inequality: The Moderating Effect of Entrepreneurship, Rural Development and Infrastructure. Global Business and Management Research: An International Journal.14. https://www.gbmrjournal.com/pdf/v14n3s/V14N3s-13.pdf

Ratha, D. (2003). Workers' remittances: An important and stable source of external development finance. *Global Development Finance, 2003*, 157–175. https://ssrn.com/abstract=3201568

Singh, R., & Tiwari, R. (2020). Remittances and income inequality in India: Evidence from state-level data. Economic and Political Weekly, 55(52), 45–53. https://www.epw.in/tags/income-inequality

