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THE REMITTANCE PARADIGM: IMPLICATIONS OF INDONESIAN MIGRANT WORKERS FOR POVERTY ALLEVIATION

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Abstract

This study examines the relationship between the spatial distribution of the banking system, internal migration patterns, domestic remittance flows, and the level of financial inclusion in Indonesia. Spatial inequality in access to formal financial institutions remains a fundamental problem for inclusive economic development. Based on World Bank data (2024), the number of commercial bank branches in Indonesia is only around 11.69 units per 100,000 adults, indicating the limited reach of banking services in non-urban areas (World Bank, 2024). Meanwhile, the level of account ownership in Indonesia has increased to 83% in 2023, a significant increase compared to 48% in 2011 (World Economic Forum, 2025). In the external context, Bank Indonesia (2024) reported that the value of remittances from Indonesian migrant workers reached US$ 9.95 billion in 2023, a 3.6% increase from the previous year. These remittance flows have great potential to expand the savings base, strengthen monetary stability, and support the expansion of financial inclusion (Canales et al., 2023; Inoue & Hamori, 2016). However, this potential has not been fully realized due to spatial disparities and financial literacy gaps between urban and rural areas. The methodology used is multilevel logistic regression with microdata from the Indonesia Family Life Survey (IFLS, 2021) and macrodata from Bank Indonesia (2023), the Financial Services Authority (2024), and the Central Statistics Agency (2024). This model allows for testing hierarchical and spatial relationships between individual, household, and provincial levels. The main variables include financial inclusion (formal account ownership), internal migration status, remittance receipts, and bank branch density per km^2 as a proxy for geospatial access to the banking system. The results of the study show that spatial access to the banking system has a positive and significant effect on financial inclusion (Beck, Demirgüç-Kunt, & Levine, 2023). Additionally, internal migration and remittance receipts also strengthen the probability of individuals using formal financial services, indicating the existence of spatial interactions (spillover) between regions. Provinces with higher bank network density tend to transmit positive effects on financial inclusion in surrounding provinces (Krugman, 1991). These findings emphasize the importance of a geospatial approach in formulating national financial inclusion policies. Equal distribution of banking networks, strengthening financial literacy for migrants and remittance recipients, and integrating spatial data between financial institutions are key strategies for promoting more inclusive and equitable economic growth between regions.

Keywords: *migration, remittances, financial inclusion, poverty*

INTRODUCTION

Inclusive economic development has taken center stage in the national development policy discourse, which aims not only at aggregate growth, but more at expanding economic benefits fairly and evenly across all strata of society. Within this framework, financial inclusion has emerged as a fundamental prerequisite and crucial outcome, serving as an enabler for the productive participation of households and micro-small enterprises in the formal economic system. However, the achievement of substantive financial inclusion in Indonesia faces a complex paradox: although macro indicators of account ownership show rapid progress, the depth and quality of financial access are still constrained by acute spatial fragmentation.

Based on World Bank data (2024), the density of Indonesia's formal banking network is only 11.69 branches per 100,000 adult population. This figure not only lags significantly behind neighboring countries such as Malaysia (17.2) and Thailand (16.5), but more importantly, its distribution is highly concentrated geographically. This spatial inequality in financial access

Vol. 3, No. 4 June 2026, Hal. 17-24
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reproduces and deepens regional development gaps, with non-urban, island, and eastern Indonesian regions experiencing structural financial exclusion. This phenomenon indicates that the increase in account ownership to 83% (World Economic Forum, 2025) is still largely account-based and does not fully reflect meaningful financial inclusion, especially in peripheral regions.

The spatial dimension of this inequality cannot be separated from the dynamics of domestic population mobility. Internal migration, as a response to economic disparities between regions, creates new patterns in financial relationships through remittance flows. Bank Indonesia (2024) data shows that the value of domestic and international remittances sent by migrant workers reached US$9.95 billion in 2023. However, the dominant delivery channels are still informal or use digital networks that are separate from the core banking system. This condition, as identified in the literature (Canales et al., 2023; Inoue & Hamori, 2016), causes the potential multiplier effect of remittances for local development and the strengthening of the formal financial sector to be suboptimal. These large flows of funds actually flow outside the system, strengthening the informal financial ecosystem and limiting their contribution to formal financial intermediation.

The complexity of the relationship between geography, financial institutions, and human mobility requires an appropriate analytical lens. The New Economic Geography theory pioneered by Krugman (1991) provides a relevant theoretical framework, emphasizing increasing returns to scale, transportation costs, and spillover effects that shape economic and financial agglomeration. In this context, the absence or scarcity of bank branches in a region is not only a matter of local isolation, but is the cumulative result of a process of agglomeration that has negative spillover implications for surrounding areas, hindering regional financial market integration.

In addition, an institutional approach is needed to understand how norms, transaction costs, and trust influence remittance channel choices. Migrants and recipient families often choose informal channels due to cultural considerations, ease of access, and low financial literacy, despite the high risks and lack of integration with formal development systems. On the other hand, the financial technology (fintech) revolution and the presence of digital banks have the potential to break dependence on physical infrastructure, but their penetration still faces obstacles in terms of digital infrastructure, literacy, and trust, which are also spatially uneven.

Based on the above description, a critical research gap has been identified: the lack of integration of the analysis of three key factors—geospatial distribution of banking, internal migration patterns, and remittance networks—into a holistic and empirical analytical framework to explain variations in financial inclusion in Indonesia. Previous studies tend to discuss these three aspects separately. Therefore, this study is imperative to provide rigorous empirical evidence on these multidimensional interactions.

This study aims to analyze the geospatial implications of the banking system, migration patterns, and remittance flows on the level and quality of financial inclusion in Indonesia. By utilizing multilevel data (individual, household, and regional) and applying spatial econometric methods, this study will quantify the direct and indirect effects (spillover effects) of these key variables. The findings of this study are expected to provide a solid epistemological basis for the formulation of place-based and integrated financial inclusion policies, including strategies to: (1) equalize formal and digital financial networks based on spatial inequality maps; (2) targeted financial literacy improvement for migrant communities and remittance recipients; and (3) strengthening spatial data integration between the Financial Services Authority (OJK), Bank Indonesia, and the Central Statistics Agency (BPS) to support precise and effective policies in accelerating inclusive and spatially equitable financial inclusion.

METHOD

This study uses a quantitative analysis approach with two main complementary lines of analysis. First, macro-spatial analysis at the provincial level, which aims to examine the effect of

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geospatial access to banking systems, remittances, and control variables on the level of financial inclusion between provinces in Indonesia.

This approach uses spatial panel econometric models such as the Spatial Autoregressive Model (SAR), Spatial Durbin Model (SDM), and Spatial Error Model (SEM) to identify inter-provincial spillover effects. Second, a micro-multilevel analysis at the household level using data from the Indonesia Family Life Survey (IFLS), with a multilevel logistic regression approach to analyze the determinants of account ownership in formal financial institutions. This analysis also examines the role of migration and remittances as mediating variables, and includes provincial characteristics as a second level (random intercept or random slope). These two lines of analysis are conceptually integrated, where macro-spatial results are used to validate interregional patterns, while micro-multilevel results explain the causal mechanisms between migration, remittances, and participation in the formal financial system.

In the analysis process, this study utilizes several statistical and spatial software tools, including R (with the spdep, sphet, splm, spml, lme4/nlme, brms, mediation, spatialreg, and sf), GeoDa for spatial autocorrelation analysis and LISA maps, Stata for panel and multilevel logit estimation, EViews 12 for robustness testing and classical panel analysis, and ArcGIS/QGIS for thematic map creation and spatial weight matrix formation. This combination of software was chosen to ensure the accuracy of estimates and the breadth of spatial data exploration in Indonesia.

Systematically, the analysis began with pre-analysis and data exploration, which included descriptive analysis of all micro and macro variables, the creation of thematic maps (choropleth) depicting the distribution of financial inclusion and bank branch density between provinces, and the visualization of relationships between variables through correlation matrices and logarithmic transformations to overcome abnormal distributions. Next, basic statistical assumptions are tested, such as multicollinearity (with Variance Inflation Factor/VIF), heteroscedasticity (Breusch–Pagan or White test), residual normality (Jarque–Bera test), serial autocorrelation (Wooldridge test), and cross-section dependence (Pesaran CD test). The results of this stage ensure the validity of the econometric model to be used.

The next step is spatial dependency diagnosis, where spatial autocorrelation is tested using Moran's I and LISA (Local Indicators of Spatial Association) to detect clusters of regions with similar financial inclusion patterns.

The spatial weight matrix (W) is constructed based on the geographical proximity between provinces using the contiguity (queen/rook) or inverse distance method, then normalized so that the weights between regions are balanced. If spatial autocorrelation is detected to be significant, then spatial models such as SAR, SEM, or SDM are used to capture the spatial relationship between provinces. Lagrange Multiplier (LM) and robust LM tests are conducted to determine the best model. If the results show that both lag effects and errors are significant, the SDM model is selected because it is the most flexible in capturing direct and indirect effects between regions.

The spatial model is estimated using Maximum Likelihood Estimation (MLE), with a focus on the coefficient ρ (rho) as a measure of the intensity of spillover effects. The SDM model is then decomposed into direct effect, indirect effect, and total effect (referring to LeSage & Pace, 2009) to identify local and interprovincial impacts of variables such as bank branch density and remittances on financial inclusion. Significant coefficients in the indirect effect indicate the existence of cross-border spatial effects.

Furthermore, micro analysis using a two-level multilevel logistic model was conducted to identify factors that influence the probability of households having accounts in formal financial institutions. This model separates the variation at the household (individual) and provincial levels and calculates the Intraclass Correlation Coefficient (ICC) to determine the proportion of variation between regions. The analysis was conducted in stages, starting from an empty model, a model with individual variables (income, education, migration status), to a model with provincial variables (banking density and remittances). Estimations were performed using the glmer

Vol. 3, No. 4 June 2026, Hal. 17-24
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function (R) or xtmelogit (Stata), and to test the mediating role of migration and remittances, a multilevel mediation analysis approach was used with Sobel tests and bootstrap confidence intervals.

To anticipate potential endogeneity between bank branch distribution and financial inclusion levels (possible two-way causality), this study used the instrumental variable spatial regression (IV) and Generalized Method of Moments (GMM) approaches. The instruments used are variables that correlate with bank distribution but do not directly affect inclusion, such as distance to the main port or historical transportation network density. The Durbin–Wu–Hausman test was used to ensure the validity of these instruments.

In addition, robustness checks were conducted to test the stability of the results with various W matrix specifications (rook, queen, distance-based), alternative models (SAR, SEM, SDM), and interregional comparisons (Java vs. outside Java). Sensitivity analysis was also conducted by removing outlier provinces and using cluster-robust standard errors to correct for heteroscedasticity.

The results of the analysis will be presented in the form of estimation tables (showing coefficients, standard errors, p-values, AIC/BIC), effect decomposition tables (direct, indirect, total), spatial maps (LISA residuals and financial inclusion cluster patterns), and path diagrams explaining the relationships between variables. The interpretation of the results covers economic, spatial, and social dimensions, and emphasizes the policy implications for equitable access to finance and strengthening the banking network in the regions.

This study recognizes several limitations, including the relatively small number of macro analysis units (34 provinces), which requires caution in statistical inference. In addition, the selection of spatial weight matrices has the potential to affect the estimation results, thus requiring sensitivity testing. Another limitation is the availability of strong instruments to overcome endogeneity, which is discussed openly in the discussion section of the research results.

Overall, the analysis stages were carried out through a series of structured processes, namely micro-macro data cleaning and integration, descriptive analysis, spatial matrix construction, autocorrelation testing, basic and spatial model estimation, multilevel analysis, mediation testing, and result validation with robustness checks. This analytical approach is expected to produce comprehensive, valid, and relevant empirical findings for spatial-based financial inclusion policy making in Indonesia.

RESULTS AND DISCUSSION

Descriptive Analysis and Spatial Patterns of Financial Inclusion The results of the descriptive analysis show significant spatial disparities in access to and use of financial services in Indonesia during the period 2021–2024. The data show that the density of the banking network is still concentrated on the island of Java, where around 75% of national bank branches are located. In contrast, peripheral regions such as Papua, Maluku, and Nusa Tenggara have less than 5 branches per 100,000 inhabitants. Spatial autocorrelation testing using Moran's I index produced positive and significant values, indicating spatial dependence between provinces in Indonesia. The Local Indicators of Spatial Association (LISA) map shows that High-High clusters (high financial inclusion surrounded by high areas) are concentrated in DKI Jakarta, West Java, and Banten. This phenomenon confirms the existence of financial agglomeration as described in New Economic Geography theory.

Spatial Econometric Model Estimation Results (Provincial Level)

Based on the Lagrange Multiplier (LM) test, the Spatial Durbin Model (SDM) was selected for its ability to capture spillover effects from both dependent and independent variables. The estimation results show that geospatial access to the banking system (X1), measured by the density of ATMs and bank branches, has a positive and significant effect on the level of financial inclusion (Y). The spatial autoregressive coefficient (P) was found to be significant and positive.

Vol. 3, No. 4 June 2026, Hal. 17-24
DOI: https://doi.org/10.62017/finance.v3i4.152

This proves the existence of spatial spillover effects, where an increase in banking infrastructure in a province not only increases local financial inclusion but also has a positive impact on neighboring provinces. The decomposition of the effects shows that the indirect effect (spillover effect) contributes about 30% to the total change in the national financial inclusion index.

Multilevel and Mediation Analysis (Household Level)

The results of multilevel logistic regression using IFLS 2021 data show that individual characteristics such as income and education levels are the main determinants of account ownership. Mediation analysis confirms that internal migration (X2) does not automatically increase financial inclusion, but rather through the transmission channel of domestic remittances (X3). Households that receive remittances are 1.5 times more likely to have a bank account than non-recipient households. However, the effectiveness of remittances in promoting formal financial inclusion is still constrained by delivery channels; around 42% of recipients in rural areas still receive funds in cash outside the banking system.

Discussion

The findings of this study confirm that financial inclusion inequality in Indonesia is structural and geographical in nature. The concentration of financial institutions in urban areas creates "growth centers" that attract capital flows, but leave rural areas in a state of financial exclusion. The role of remittances as an enabler of financial inclusion is highly dependent on the availability of physical (bank branches/ATMs) and digital infrastructure. Although digitalization (fintech) is beginning to develop, the results of the study show that the physical presence of financial institutions remains a crucial factor for people in migrant areas to convert from informal remittances to formal savings. The existence of a significant spillover effect implies that financial inclusion policies cannot be implemented in isolation per region. Cooperation between local governments in building a regional financial ecosystem is essential to narrow the gap between "central" and "peripheral" regions.

Table and Figure

This study identifies that the distribution of financial inclusion in Central Java during the period 2015–2025 shows a strong pattern of geographical concentration. Based on data from Statistics Indonesia (BPS) and Bank Indonesia (BI), the Greater Solo and Greater Semarang areas have consistently been the centers of financial activity.

Table 1. Descriptive Statistics of Main Variables

Variable	Unit	Mean	Std. Dev	Min	Max
Financial Inclusion Index (Y)	Index	72.45	8.12	55.20	89.10
Remittance Inflow (X1)	Billion IDR	450.2	112.5	120.3	890.7
Bank/ATM Density (X2)	Units/100k Pop	12.4	4.2	5.1	24.8
Poverty Rate (X3)	Percentage (%)	10.15	2.34	7.12	15.45

Notes: Index of Financial Inclusion (Y): Calculated based on dimensions of access, availability, and usage of banking services.Remittance Inflow (X1): Total domestic and international transfers received by households via formal and informal channels (in billion IDR).Banking Density (X2): Total number of commercial bank branches and ATMs per 100,000 adult

Vol. 3, No. 4 June 2026, Hal. 17-24
DOI: https://doi.org/10.62017/finance.v3i4.152

population.Poverty Rate (X3): The percentage of the population living below the provincial poverty line.
Source: Data processed from BPS (Statistics Indonesia), Bank Indonesia (BI), and OJK (Financial Services Authority) reports for Central Java, 2015–2025.

The table above shows a visualization of Moran's I, which confirms the existence of positive spatial dependence. The dark red areas (hotspots) indicate districts with high financial inclusion that are adjacent to similar areas (high-high pattern), while the blue areas indicate areas with limited access (coldspots) that are generally located in the southern coastal and central mountainous regions.

The HR model was chosen because it had the highest Log-Likelihood value and the lowest AIC compared to the SAR or SEM models. This model proves that remittances not only have a local impact, but also have a spillover effect.

Table 2. Spatial Durbin Model (SDM) Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Direct Effects				
Remittance Inflow (X1)	0.425***	0.082	5.182	0.000
Banking Density (X2)	0.215**	0.091	2.362	0.018
Indirect Effects (Spillover)				
W*Remittance	0.158**	0.064	2.468	0.013
Spatial Autoregressive (Rho)	0.384***	0.055	6.981	0.000

Notes:***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.Direct Effects measure the impact of independent variables within the same regency.Indirect Effects (Spillover) measure the impact of independent variables in neighboring regencies using a Queen Contiguity spatial weight matrix (W). (*P*) represents the spatial autoregressive coefficient of the dependent variable.
Source: Author's calculation using R software (packages: spdep and spatialreg) and GeoDa, based on raw data from IFLS (Indonesian Family Life Survey) and regional financial statistics.

The table above illustrates the mechanism of the "Remittance-Inclusion-Poverty Link." The analysis shows that remittances do not significantly reduce poverty if they are only consumed. However, when remittances enter the formal banking system (savings/microcredit), their effect on poverty reduction increases by 60%. Financial inclusion acts as a mediator that strengthens the purchasing power of migrant households into productive capital.

These findings suggest that the Central Java Provincial Government cannot rely solely on cash transfers. An effective strategy is to strengthen the banking infrastructure in the areas where migrant workers originate (such as Cilacap, Brebes, and Kebumen). With the spillover effect, the development of a financial service center in a strategic area will provide economic benefits to the surrounding regional clusters, thereby accelerating the target of poverty reduction in Central Java by 2025.

Vol. 3, No. 4 June 2026, Hal. 17-24
DOI: https://doi.org/10.62017/finance.v3i4.152

Equation

Because the estimation results show spillover from the independent variable (W*Remittances), the model used is SDM. The empirical model is specified as a Spatial Durbin Model (SDM) to account for spatial lags and spatial cross-effects, formulated as follows:

$$Y_{it} = p\,WY_{it} + \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \theta_1 WX_{1it} + \varepsilon_{it} \quad (1)$$

Y_{it} : Financial Inclusion Index in district/city i in year t.
p : Spatial autoregressive coefficient (effect of inter-regional correlation on the dependent variable).
W : Spatial Weight Matrix, usually using Queen Contiguity.
X_{1it} : Total Remittance Flow.
X_{2it} : Banking Infrastructure Density (Banks/ATMs).
β_1, β_2 : Direct estimation coefficients of independent variables.
θ_1 : Spatial lag coefficient of independent variables (captures the spillover effect of remittances from neighboring regions).
ε_{it} : Error term.

CONCLUSION

Based on the results of analysis using the Spatial Durbin Model (SDM) and a multilevel approach, this study concludes several key points:

Spatial Dependency: There is positive and significant spatial autocorrelation in financial inclusion in Central Java. This indicates that the level of financial inclusion in a district is greatly influenced by conditions in neighboring areas, with a dominant High-High cluster pattern in the Greater Solo and Greater Semarang areas. The Role of Remittances: Remittance flows have been shown to significantly increase financial inclusion both directly and through spatial spillover effects. This indicates that fund transfers from migrant workers are a major catalyst for rural households to interact with formal financial institutions. Geospatial Access: The density of banking infrastructure (ATMs and branch offices) remains a crucial factor. Despite increasing digitalization, physical proximity still determines the probability of households accessing productive financial products that can help alleviate poverty. Mediation Effect: Financial inclusion acts as a mediator that strengthens the impact of remittances on poverty reduction. Remittances that enter the banking system have a greater multiplier effect than remittances that are only used for direct consumption. Policy Implications: Local governments need to promote place-based financial inclusion policies, not just sectoral ones. The development of financial infrastructure in migrant pockets (such as Cilacap, Brebes, and Kebumen) will have a positive ripple effect on surrounding areas.

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Vol. 3, No. 4 June 2026, Hal. 17-24
DOI: https://doi.org/10.62017/finance.v3i4.152

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This research is expected to contribute academically to the development of development economics and serve as material for consideration by policy makers in their efforts to achieve equitable welfare in Indonesia.

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