

Digital Connectivity and Standard of Living

Investigating the Impact of Broadband Access

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Motivation

Problem

Does better access to broadband internet actually lead to lower poverty and higher literacy around the world, especially in less developed areas?

Why is it Important?

The "digital divide" persists globally, potentially worsening existing inequalities in opportunity and quality of life.

Data

Downloaded from the World Bank's World Development Indicators (WDI) database via their website/API.

Files were cleaned and merged using Python (Pandas).

Timeframe: 2013 – 2023 (Main Panel); 2005 (Instrument)

Size: ~217 unique countries/entities, ~11 years per entity

Total observations ~2387

Content: Digital connectivity, economic, demographic, education, and health indicators.



Our Approaches

★ Fixed Effects (FE)

Isolates within-country variation over time

★ Random Forest (RF)

Ranks predictors and models non-linear effects

★ Structural Equation Modeling (SEM)

Tests causal pathways (e.g. Broadband → Literacy → Poverty)

★ Two-Stage Least Squares (2SLS)

Leverages historical telecom access to estimate causal effects of broadband

★ Quantile Regression (QR)

Reveals if broadband impacts vary by poverty level

★ Visuals

Explore trends, geographic patterns, and variable relationships

Why Effective and What's New?

FE helps control for unobserved country traits. IV offers potential causal identification. ML models like RF and QR capture complex, non-linear effects. Visualizations clarify insights and patterns. We combine modern econometrics and ML on a recent, global panel, using a novel telecom instrument and focusing on standard-of-living outcomes (poverty, literacy) rather than GDP.

Experiments & Results

Approach: Compare model outputs (coefficients, p-values) for broadband's impact on poverty and literacy. Robustness checks include FE for country-level controls, 2SLS for endogeneity, and RF for feature importance. SEM and QR explore indirect and distributional effects.

Key Results & Comparisons: FE models show that increased broadband access is significantly associated with reduced poverty, while 2SLS finds the opposite effect. Random Forest models rank broadband lower in importance compared to literacy, life expectancy, and urbanization, while QR results suggest the broadband-poverty relationship varies across income levels. SEM reveals weak indirect effects through literacy. These mixed findings emphasize the complexity of drawing causal conclusions.

