Estimating the Impact of Rural Feeder Roads in Rwanda

What is the impact of rural road upgrading program on market integration and household welfare in Rwanda?

Rwanda Feeder Roads Development Program

TARGET AREA:
21 districts across all 4 provinces.

OBJECTIVE:
To bring a motorable road within 2km of all farms in Rwanda by 2027.

UPGRADING COMPONENTS:
Widening to the new 6-meter standard (2 lanes); Adding a base layer and resurfacing with lateritic soil; Constructing drainage structures.

More information about the Rwanda Feeder Roads Development Program can be found online at http://projects.worldbank.org/P126498/rwanda-feeder-roads-development-project?lang=en&tab=overview

Upgraded rural road

Context

Rwanda's rural road network is estimated at 15,000 km, which consists predominantly of very poor condition dirt roads with no current maintenance program. In 2016, only 55% of the population were within 2km of an all-season road in good condition. The poor quality of the road network hinders trade and rural development. As most roads are not passable by motor vehicle, farmers rely on human and intermediate means of transport to bring their products to market, produce tends to be self-consumed instead of marketed. Poor connectivity also results in high inputs prices, further constraining smallholder productivity.

In this context, the Government of Rwanda (GoR) is engaged in an ambitious rural road improvement program (Rwanda Feeder Roads Development program, RFRDP), financed by four donor agencies (USAID, EU, the Netherlands and the World Bank). The development objectives of this program are to enhance market access and reduce transport costs for people as well as goods. Over the next four years, the program will upgrade a share of Rwanda's current feeder road network into an all-season, maintained dirt road system.

PRELIMINARY RESULTS

Households in the most remote (poorest on average) areas experienced the largest benefits from road rehabilitation, some saw a nearly **20% increase in income**.

Impact Evaluation Research

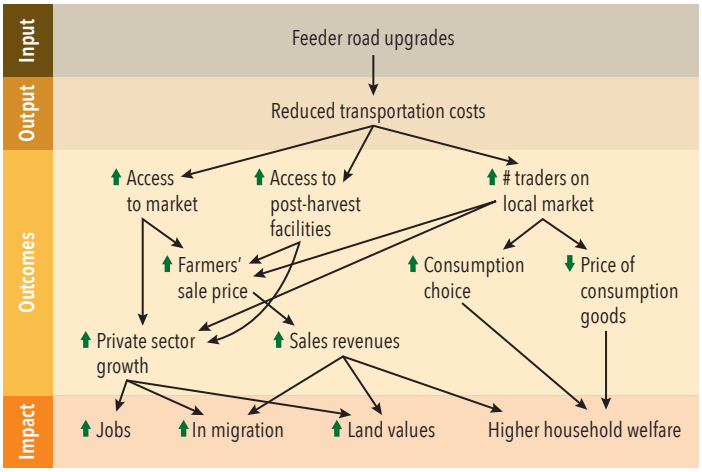
The key research questions of this research are: i) How are market prices of village imports and exports affected by improvements in rural roads? ii) How do households adapt to these price changes in terms of goods produced and purchased? iii) What is the market valuation of improved road access as measured by aggregate land value changes? and iv) To what extent do roads help a region develop as measured by total population?

This Impact Evaluation (IE) uses an event study design, taking advantage of the quasi-random timing of the rollout of rural road upgrading across Rwandan districts. The key outcome variables are market prices, land prices, household consumption and production, and the key explanatory variable is road roughness before and after the road upgrading. Identification requires that the exact timing of the intervention is as good as random. In this context, idiosyncratic factors such as donor disbursement calendars, construction delays, permits and weather all suggest that is indeed the case for construction completion date for each road segment. This provides plausibly exogenous temporal variations in road quality. The research team will have data on the exact timing of both the road improvement initiation and completion dates. Causal changes in outcomes of interest (i.e. prices, quantities traded) can therefore be estimated around the timing of the event (rehabilitation).

Preliminary results from the subset of districts with completed segments are promising. Households in the most remote areas are significantly poorer on average. However, they experience the largest benefits from road rehabilitation. Incomes in the most remote villages increase nearly 20%, allowing them to fully catch up on the initial income gap. Future surveys will show if these income gains persist over time.

Policy Relevance

Evaluating the impact of large-scale road upgrading on market conditions in remote rural areas presents a complex methodological challenge. Typically, a small number of roads are rehabilitated due to substantial construction costs, which limits statistical power. This IE presents a unique opportunity for research and policy-making, as the total number of kilometers of roads in RFRDP is far greater than has been afforded by previous, single-donor road improvement efforts in Africa.



Theory of Change

This IE partners with multiple international donors and the Government of Rwanda to analyze the impact of the RFRDP program. It is anticipated that the proposed study will influence both policy and institutional capacity at the national level and international levels. As roads are set to be constructed all across Rwanda during the next four years, this study can affect the amount of funds committed in the future.

The spirit of this IE is to leverage the current government's investment in administrative data collection, complemented with dedicated household survey data, to document the national impact of a large infrastructure program. This methodology can be transferrable to other road infrastructure development in the rest of Africa.

For more information email **dimetransport@worldbank.org** or visit **www.worldbank.org/en/research/dime/brief/transport**

IE CONNECT FOR IMPACT

The ieConnect for Impact program links project teams with researchers to develop rigorous and innovative impact evaluations that both substantially improve the evidence-base for policy making and induce global shifts in transport policy. The ieConnect program is a collaboration between the World Bank's Development Impact Evaluation (DIME) unit in the Development Research Group and the Transport & Digital Development Global Practice (TDD). This program is part of the Impact Evaluation to Development Impact (i2i) multi-donor trust fund, and is supported by the UKAID's Department of International Development (DFID) and the European Union (EU).