

POVERTY AND TRANSPORT: Outcomes and Challenges

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Outline

- I. Macro-level evidence from Indonesia
- II. Household-level evidence
- III. Constraints and challenges

I. MACRO-LEVEL EVIDENCE: INDONESIA

INFRASTRUCTURE, GROWTH, AND POVERTY IN INDONESIA: A CROSS-SECTIONAL ANALYSIS

E. Kwon (2001)

Study Focus

- ◆ What part did road infrastructure play in poverty reduction?

How poverty reacts to macro variables

Significance of roads in explaining poverty

- Poverty was highly sensitive to changes in nonfarm employment, wages, and agricultural production
 - most attributable to these macro variables, good roads improve access to such oppn'ties
- Poverty reduction was much more closely connected with changes in the macro variables in the good access provinces

Key Results and Implications

- 👉 the availability of road makes **the link** b/w macro variables and poverty **stronger**.
 - as road capital is accumulated, roads improve the efficiency of the macro variables in poverty
- 👉 road imprvmnt enhanced market utilization by improving the interaction between producers and consumers, employers and job seekers.
- 👉 help labor and product markets function better, which redounds to the poor indirectly over time

II. HOUSEHOLD-LEVEL EVIDENCE

WHEN *AND HOW* DO RURAL ROADS BENEFIT THE POOR?

Hemamala Hettige, OED, ADB (2002)

<http://www.adb.org/Documents/IES/Regional/ies-reg-2002-15/rural-roads.asp>

Key results

- raised agricultural productivity through crop diversification and better marketing environment
 - changes in cropping pattern with better roads
 - sold more agri products now than 5 yrs ago
 - more buyers visited after road project
- diversified income sources
 - a shift away from agriculture in the last 5 yrs
- more small businesses
- improved roads expanded access to better job opportunities outside the village

Household-level results: summary (1)

- raised agricultural productivity
 - by helping farmers diversify crops, promote crop extension and intensification
- spurred commercial and trading activities
 - by reducing transaction costs
- spurred the opening of small businesses and improved access to nonfarm employment opportunities

III. CONSTRAINTS AND CHALLENGES

Project's benefits reaching the poor are limited

- constraints
 - prevailing social structure: the concentration of landownership, indebtedness to intermediaries
 - lack of capital and skills
 - lack of information and inability of the poor to impose their rights to work opportunities

Project's benefits reaching the poor are limited

As a result,

- better marketing access did not necessarily lead to better prices for poor farmers
- difficult for the poor to exploit the economic opportunities brought by road improvement

Prevailing social structure

- **Sorsogon (PHI):**
 - most farmers, smallholder tenants, committed to landlords under a tenancy agreement
 - no change in sale patterns of the crop, no cash crop alternatives developed.
- **Yogyakarta (INO) and Matara (SRI):**
 - more transit markets along the road and more agricultural intermediaries
 - most poor farmers, chronically indebted to intermediaries, their choices of whom to sell to and at what prices are limited.

lack of resources and skills

- The poor benefit from the economic oppn'ties only if they have initial capital
 - only those who have extra funds, an agri surplus to sell, or a network outside could take advantages of trading or working oppn'ties
- Majority of employment oppn'ties outside were temporary, seasonal, low-paid work—the only type for which the poor usually qualify
 - labor markets in remote areas are imperfect and accessing information is difficult

Constraints

Transport infrastructure is an acknowledged public good, and its benefits are available to all.

how to help the poor tap economic and social opportunities road improvements bring?

Challenges:

- incentives to accumulate physical and human capital so that the poor make better use of the economic benefits that better roads bring
- alternative employment strategies needed, which will be sufficiently secure and pay well for the poor to consider trying them out
- complementary programs to enhance the ability of the poor to diversify income sources
- special attention to increase mobility for the poor within the village

Thank You

ADB

- ◆ Data: A panel from 25 provinces (1976-1996)
- ◆ Cross-Sectional Difference:
 - intervening pattern of roads in poverty reduction would vary b/w provinces with good access and those without
- ◆ To see the difference in the behavior the two subgroups manifested and the reasons behind them

◆ Cross-Sectional Difference

Provinces classified according to access to roads:

- Benchmarking being the mean road density in 1976
- Assumed sufficient road services in good-access provinces and insufficient in bad-access provinces
- 19 Bad-access, 6 Good-access provinces

◆ Cross-Sectional Difference

Correlations of Poverty with Other Variables

	TRN	IRR	EDU	HEL	TEC	AF
Total	-0.2525	-0.2328	-0.0411	-0.0586	-0.0477	-0.1095
Bad Access	-0.2612	-0.3016	0.0304	0.0606	0.0202	-0.0498
Good Access	-0.5851	-0.3176	-0.4471	-0.5853	-0.4021	-0.5095

	GDP	AP	RDEN	NAEMP	WAGE
Total	-0.3367	-0.1886	-0.4652	-0.2692	-0.2269
Bad Access	-0.3100	-0.3570	-0.5105	-0.4629	-0.1753
Good Access	-0.7923	0.2531	-0.3707	0.2216	-0.7634

6 Good road-access provinces:

**Bali, Central Java, East Java, West Java,
North Sulawesi, DI Yogyakarta**

19 bad-access provinces:

**D.I., Aceh, Bengkulu, Jambi, Irian, Jaya,
Central, Kalimantan, East Kalimantan,
South Kalimantan, West Kalimantan,
Lampung, Maluku, East Nusa Tenggara, West
Nusa Tenggara, Riau, Central Sulawesi, South
Sulawesi, Southeast Sulawesi, North
Sumatera, South Sumatera, West Sumatera**

◆ Sample Statistics

%	All provinces	Bad Access Provinces	Good Access Provinces
% of road Investment	26.5	29.7	18.5
Agr productivity	25.2	3.6	28.3
Road density	61.4	38.0	317
Nonfarm Emp	0.4	0.3	0.5
Wage growth	3.8	3.5	4.8
Poverty	19.6	20.7	15.9
Irrigated area	24.3	19.8	26.2

EMPIRICAL ANALYSIS

◆ How Poverty Reacts to Each Variable

$$POV_t = \alpha_0 + \alpha_1 POV_{t-1} + \beta_1 x_t + \sum_{j=1, 10} \beta_{i+1} x_{t-i} + \sum_{j=1, 25} \delta_j D_j + u_t$$

◆ How Poverty Reacts to Each Variable

Sensitivity of Poverty: $POV = \beta x + u$

(x_t)	Government Investment						
	DEV	IRR	ROAD	HEALTH	R&D	AG&FRS	EDU
5 years	-0.55	-0.11	-0.30	0.07	-0.02	-0.13	-0.15
10 years	-0.55	-0.09	-0.34	0.16	0.12	-0.12	-0.15

(x_t)	Macro Variables				
	AGR EMP	NF EMP	GDP	APROD	WAGE
5 years	-0.28	-0.80	-0.39	-0.23	-1.12
10 years	-0.70	-0.84	-0.52	-1.06	-1.12

◆ Significance of Roads in Explaining Poverty

- Roads have significant explanatory power for poverty

=> Road capital itself has its own influence on poverty.

◆ Significance of Roads in Explaining Poverty

$$POV = \beta X + u \quad (1)$$

$$POV = \beta X + \beta_2 ROAD_{-1} + u \quad (2)$$

◆ Significance of Roads in Explaining Poverty

$$\begin{aligned}POV_t = & \alpha_0 + \alpha_1 POV_{t-1} + \beta_1^B X_t I^G + \\ & (\beta_1^G - \beta_1^B) X_t I^G + \beta_2^B ROAD_{t-1} I^G + \\ & (\beta_2^G - \beta_2^B) ROAD_{t-1} I^G + u_t\end{aligned}\quad (3)$$

where: $I^G = 1$, if good-access provinces
[province?]

0, if otherwise

◆ Significance of Roads in Explaining Poverty

	All Provinces	
	Coefficient	Significance Level
Constant	1.41	0.000
$\alpha_1 (POV_{t-1})$	0.58	0.000
$\beta_1^B (X_t I^G)$	-0.26*	0.000
$(\beta_1^G - \beta_1^B) (X_t I^G)$	-0.64*	0.005
$\beta_2^L (ROAD_{t-1} I^G)$	-0.13*	0.000
$(\beta_2^G - \beta_2^B) (ROAD_{t-1} I^G)$	-0.025	0.607

◆ Do Roads Affect Performance of Macro Variables in Poverty Reduction?

	$X_t = \text{GDP}$				$X_t = \text{NFEMP}$			
	Bad		Good		Bad		Good	
	Coef	Sig. Level	Coef	Sig. Level	Coef	Sig. Level	Coef	Sig. Level
α_0	3.41	0.53	4.69	0.01	-0.23	0.53	0.52	0.04
α_1	0.60	0.00	0.51	0.00	0.57	0.00	0.50	0.00
β_1	-0.95*	0.03	-0.71*	0.09	-1.08*	0.00	-2.73*	0.00
β_2	0.51	0.35	0.17	0.71	0.01	0.90	1.50	0.39

◆ Do Roads Affect Performance of Macro Variables in Poverty Reduction?

	$X_t = \text{APROD}$				$X_t = \text{WAGE}$			
	Bad		Good		Bad		Good	
	Coef	Sig. Level	Coef	Sig. Level	Coef	Sig. Level	Coef	Sig. Level
α_0	8.39	0.00	16.69	0.06	23.07	0.00	11.37	0.08
α_1	0.36	0.06	0.19	0.61	0.30	0.00	0.51	0.01
β_1	0.25	0.70	-3.53	0.21	-0.61*	0.10	-2.11*	0.03
β_2	-1.47*	0.05	-4.57*	0.10	-0.97*	0.05	1.37	0.33

CONCLUSIONS

2. Road capital affects poverty by itself, as well as through macro variables:

Local roads in rural areas have a direct impact on the daily life of the poor by improving their welfare and increasing human capital formation.

Major roads, such as expressways, are strategically important for the national economy. They stimulate growth by enhancing economic efficiency and market performance. As such, the impacts of major roads on poverty are likely to be indirect and mostly induced by expanded economic activities resulting from a better road network (complementary roles).

👉 This implication should be considered in the structural model to assess the impacts.

PHI: Sorsogon: Integrated Area Devt Project (Imprvmnt roads)

- rehabilitation of 15 communal irrigation schemes
- copra, smallholder tenant farmers

Negros: Improvement of national roads

- 3 km away from national road. sugarcane (52%) paddy (27%). most villagers are wage laborers for the Hacienda (as labor)

INO Bengkulu: Tree Crop Smallholder Sector Project

- plantation establishment and maintenance, construction of roads
- farm laborers (71%), unfavorable soil conditions

Yogyakarta: Rehab of roads, bridges, maintenance

- wetland (83%), 63% of villagers having less 0.5 ha
- 87% income from agriculture, crop production limited

INO Kurunegala: Rehab of rural roads and irrigation systems

- drought experienced for the last 3 years
- rice; lack of water source

Matara: Rehab of 550 km of secondary roads

- tea and farm labor to tea estates, near to markets

Project's general benefits

- Project households had
 - more opportunities to travel for all tasks,
 - greater access to transport services,
 - a variety of services available in the community (safe sources of drinking water, modern sanitary and toilet facilities, crop processing facilities, etc)
 - more livelihood opportunities outside the village
 - more contact and communication outside the community

Agricultural productivity, better marketing

- changes in cropping pattern with better roads
 - crops **more** diversified now than 5 yrs ago (45%)
 - diversification (pili nuts in Sorsogon), intensification (rubber in Bengkulu)
- sold more agri products now than 5 yrs ago
 - attributed to better marketing opportunities (67%)
- more buyers visited after road project
 - project (54%); control (36%)

Nonfarm work opportunities

- projects expanded access to employment opportunities outside the village
 - twice as many project HH as control HH had outside employment opportunities, or a secondary income stream
 - more HH members in project sites were hired for regular jobs or relatively longer-term urban employment

Nonfarm work opportunities

- **diversified income sources**
 - a shift away from agriculture in last 5 yrs
 - changes in sources: project 53%, control 42%
- **more small businesses (64% of respondents)**
 - of those who had bz prior to project, most indicated a (+) effect of road (55%)
 - of those who started a bz since project, the road inspired them to start bz (70%)
 - a few households graduated from poverty, helped along by road improvement

Challenges

- examples: microfinancing, training, improving labor markets, etc.
- special attention to increase mobility for the poor within the village.
 - vital to improve the primary village network of paths, tracks, culverts, and basic access routes, which will reduce the burden of subsistence tasks.