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INVESTMENT PRIORITIES FOR ECONOMIC GROWTH AND POVERTY REDUCTION

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Public investments have contributed significantly to agricultural growth and rural poverty reduction in rural areas, and to urban poverty reduction through growth in the national economy and lower food prices. Without such investments, agricultural and national economic growth would have been much slower, and many more rural and urban people in developing countries would be poor. Yet, despite these successes, the poor still number about 1 billion, and many developing-country governments still face severe budget constraints. Thus, public resources need to be targeted more effectively to the sectors and regions that can generate the largest economic growth and poverty reduction. This brief presents a synthesis and review of several case studies conducted by IFPRI and its national collaborators to quantify the effects of government spending on both growth and poverty reduction in India, China, Vietnam, Thailand, and Uganda—countries representing different stages of economic development and, hence, the need for different spending priorities.

The Impact of Public Spending in India

Using state-level data spanning 1970 to 1993, the India study clearly shows that additional government expenditure on roads has the largest poverty-reducing impact, as well as a significant impact on productivity growth (Table 1). For every 1 million rupees spent on rural roads, 124 poor people could be lifted above the poverty line—the largest rate of poverty reduction among all types of investment. Furthermore, 1 rupee invested in rural roads would generate more than 5 rupees in returns from agricultural production, which is the second-largest production growth effect after agricultural research and development (R&D). Additional government spending on agricultural R&D and extension has the largest impact on production growth, with a cost–benefit ratio of 13; it also leads to large rural poverty-reduction benefits, second only to rural road investment. Additional government spending on education has the third-largest impact in reducing rural poverty, largely because of the increases in nonfarm employment and rural wages that it induces. Finally, public investment in irrigation has an impact on agricultural productivity similar to that of education investments and only a small impact in reducing rural poverty.

Table 1—Returns to Agricultural Research in India, State-Level Analysis, 1993

Sector	Returns in Rupee per Rupee Spending	Numbers of Poor Reduced per Million Rupees
R&D	13.45	84.5
Irrigation	1.36	9.7
Roads	5.31	123.8
Education	1.39	41.0
Power	0.26	3.8
Soil and water conservation	0.96	22.6
Health	0.84	25.5
Anti-poverty programs	1.09	17.8

Source: Calculated by authors from S. Fan, P. Hazell, and S. Thorat, "Government Spending, Agricultural Growth, and Poverty in Rural India," *American Journal of Agricultural Economics* (Vol. 82, No. 4, 2000).

Another study found that, for every type of investment, the highest marginal impact on agricultural production and poverty alleviation occurs in rainfed lands, while irrigated areas rank second or last. Moreover, many types of investments in low-potential rainfed lands yield some of the highest production returns, and all investments except education have some of the most favorable impacts on poverty. These results strongly suggest that more investment should be channeled into less-favored areas.

The Impact of Public Spending in China

The Chinese case studies indicate that government expenditure on education had the largest impact on reducing rural poverty and regional inequality and had significant impact on production growth (Table 2). Increased rural nonfarm employment was responsible for much of this poverty- and inequality-reducing effect. Government spending on agricultural R&D had the largest impact on agricultural production growth. The benefits of agricultural production growth also trickled down to the rural poor, with the poverty-reduction effect per unit of additional agricultural R&D investment ranking second after investment in rural education. Government spending on rural infrastructure (roads, electricity, and telecommunications) had a substantial impact on poverty and inequality, mainly through improved opportunities for nonfarm employment and increased rural wages. Investments

in irrigation had only a modest impact on agricultural production growth and an even smaller impact on rural poverty and inequality.

Table 2—Returns to Public Investment in China, 2000

Investment	Coastal	Central	Western	Average
Returns to total rural GDP	*Yuan per yuan expenditure*			
R&D	5.54	6.63	10.19	6.75
Irrigation	1.62	1.11	2.13	1.45
Roads	8.34	6.90	3.39	6.57
Education	11.98	8.72	4.76	8.96
Electricity	3.78	2.82	1.63	2.89
Telephone	4.09	4.60	3.81	4.22
Returns to agricultural GDP	*Yuan per yuan expenditure*			
R&D	5.54	6.63	10.19	6.75
Irrigation	1.62	1.11	2.13	1.45
Roads	1.62	1.74	1.73	1.69
Education	2.18	2.06	2.33	2.17
Electricity	0.81	0.78	0.88	0.82
Telephone	1.25	1.75	2.49	1.63
Returns to nonfarm GDP	*Yuan per yuan expenditure*			
Roads	6.71	5.16	1.66	4.88
Education	9.80	6.66	2.43	6.79
Electricity	2.96	2.04	0.75	2.07
Telephone	2.85	2.85	1.32	2.59
Returns to poverty reduction	*Number of poor reduced per 10,000 yuan*			
R&D	3.72	12.96	24.03	10.74
Irrigation	1.08	2.16	5.02	2.31
Roads	2.68	8.38	10.03	6.63
Education	5.03	13.90	18.93	11.88
Electricity	2.04	5.71	7.78	4.85
Telephone	1.99	8.10	13.94	6.17
Poverty loan	3.70	3.57	2.40	3.03

Source: S. Fan, L. Zhang, and X. Zhang, "Investment, Reforms, and Poverty in Rural China," *Economic Development and Cultural Change* (Vol. 52, No. 2, 2004).

For all types of government spending, the poverty-reducing returns to investments were highest in the less-developed western region, while returns from agricultural production growth were the highest in the more developed central region for most types of spending. Furthermore, investments in the western region led to the greatest reductions in regional inequality for all types of government spending, while investments in either coastal or central regions exacerbated large regional inequalities. Another study found that low-grade (mostly rural) roads have cost–benefit ratios for national GDP that are about four times larger than the cost–benefit ratios for high-grade, mostly urban, roads. Even in terms of urban GDP, the cost–benefit ratios for low-grade roads are much greater than for high-grade roads. In terms of agricultural GDP, high-grade roads have no statistically significant impact, while low-grade roads are not only significant, but also generate 1.57 yuan of agricultural GDP for every yuan invested. Investment in low-grade roads also generates high returns in rural nonfarm GDP. Every yuan invested in low-grade roads yields more than 5 yuan of rural nonfarm GDP. Equally important in terms of poverty reduction, low-grade roads raise far higher numbers of rural and urban poor above the poverty line per yuan invested than do high-grade roads.

The Impact of Public Spending in Vietnam

The results from Vietnam reveal that government investment in education has the largest poverty-reducing impact, followed by roads and agricultural R&D (Table 3), while investment in agricultural R&D has the largest return to agricultural growth, followed by roads. Investment in irrigation has the smallest impact on both agricultural growth and poverty reduction. The large poverty impacts resulting from investment in education and roads are derived from improved nonfarm employment opportunities, which accounted for 89 percent of the total education impact on poverty. The remaining gains resulted from improved agricultural production. For roads, improved nonfarm opportunities accounted for 67 percent of the total effect of road investment.

Table 3—Returns to Public Investment in Vietnam, 2000

Region	Irrigation	Roads	Education
	Dong per dong spending		
Northern uplands	0.21	1.87	0.95
Red River delta	0.40	3.26	2.08
Central north	0.22	3.27	1.01
Central coast	0.21	2.44	1.23
Highlands	0.28	3.09	1.97
Southeast	1.33	3.30	4.66
Mekong River delta	0.37	3.40	2.08
Vietnam total	0.42	3.01	2.06
Total agricultural R&D		12.22	
	Numbers of poor reduced per billion dong		
Northern uplands	12.03	153.04	65.60
Red River delta	7.93	91.38	49.40
Central north	14.90	311.57	81.28
Central coast	12.99	215.58	92.31
Highlands	8.37	130.54	70.14
Southeast	27.85	98.64	117.64
Mekong River delta	5.68	74.14	38.24
Vietnam total	12.93	132.34	76.40
Total agricultural R&D		338.96	

Source: S. Fan, Pham Lan Huong, and Trinh Quang Long, "Government Spending and Poverty Reduction in Vietnam," (IFPRI, Washington, DC, 2004).

The Impact of Public Spending in Thailand

The Thailand case study found that additional government spending on agricultural R&D improves agricultural productivity the most and has the second-largest impact in reducing rural poverty (Table 4). Investments in rural electrification have the largest impact on rural poverty and the second-largest impact on growth. These two investments dominate all others. Road expenditure has the third-largest impact in reducing rural poverty, but only a modest and statistically insignificant impact on agricultural productivity. Government spending on rural education has only the fourth-largest impact on poverty, but a significant economic impact through improved agricultural productivity. Irrigation investment has the smallest impact both in reducing rural poverty and in improving agricultural productivity. Disaggregating the investments shows that additional investments in the northeast—especially in electricity and roads—contribute more to

reducing poverty than investments in other regions. Since the growth impacts of many investments are also greater in the northeast than in other regions, there is no evident trade-off between investments for growth and investments for poverty reduction.

Table 4—Returns to Public Investment in Rural Thailand, 1999

Investment	Northeast	North	Central	South	Thailand
	Cost–benefit ratio (bhat/bhat)				
Agricultural R&D	n.a	n.a.	n.a.	n.a.	12.62
Irrigation	0.76	1.11	0.55	0.62	0.71
Roads	1.23	1.23	0.44	1.24	0.86
Education	1.26	2.92	2.89	2.51	2.12
Electricity	8.66	8.04	2.59	5.48	4.89
Phone	n.s.	n.s	n.s	n.s	n.s
	Number of poor reduced per million bhat				
Agricultural R&D	n.a	n.a	n.a	n.a	138.10
Irrigation	21.05	5.22	1.74	4.53	7.69
Roads	483.39	82.71	19.48	130.12	126.25
Education	34.74	13.71	9.08	18.53	22.75
Electricity	1,253.02	198.57	42.79	211.99	276.07
Phone	n.s	n.s	n.s	n.s	n.s

Source: S. Fan, S. Jitsuchon, and N. Methakunnavut, *The Importance of Public Investment for Reducing Rural Poverty in Middle-Income Countries: The Case of Thailand*, DSGD Discussion Paper No. 7 (Washington, DC: IFPRI, 2004).
Notes: n.a. indicates not available; n.s. indicates statistically insignificant.

The Impact of Public Spending in Uganda

All types of public spending in Uganda were found to reduce poverty while increasing agricultural production (Table 5). Sizable differences, however, resulted in production and poverty-reduction gains across expenditure items. For the country as a whole, government expenditure on agricultural R&D has the highest return to labor productivity and poverty reduction, followed closely by investments in feeder roads. Education ranked third in terms of productivity and poverty-reducing effects, whereas health had the smallest impact. For all types of investments except health, returns in terms of increased agricultural productivity were highest in the relatively well-developed western region, while returns to agricultural productivity from agricultural extension were lowest in the eastern region. The central and northern regions have the lowest returns from education and roads, while the eastern region ranks in the middle. The northern region is Uganda's poorest, with 67 percent of its residents classified as poor. In terms of poverty reduction, this region has the highest returns (except for health), with the poverty-reducing effect of spending on infrastructure and education being particularly high. For all types of investments, the poverty impact was the smallest in the central region.

Conclusions and Implications for Spending Strategy

Increasing public rural investment significantly is difficult—if not unlikely—so countries must use their public investment resources more efficiently. This requires improved targeting of investments to achieve growth and poverty-alleviation goals, as well as improved efficiency within the agencies that provide public goods and services. Reliable information on the marginal effects of various types of government spending is crucial for governments to be able to make sound investment decisions. Despite the countries' vast differences in economic systems, natural resource endowments, socioeconomic conditions, and size, these case studies offer some important lessons:

Table 5—Returns to Public Investment in Rural Uganda, 1999

Investment	Central	East	North	West	Uganda
	Cost–benefit ratio (shilling/shilling)				
Agricultural R&D	12.49	10.77	11.77	14.74	12.38
Education	2.05	3.51	2.10	3.80	2.72
Feeder roads	6.03	8.74	4.88	9.19	7.16
Murram roads	n.s.	n.s.	n.s.	n.s.	n.s.
Tarmac roads	n.s.	n.s.	n.s.	n.s.	n.s.
Health	1.37	0.92	0.37	0.96	0.90
	Number of poor reduced per million shillings				
Agricultural R&D	21.75	66.31	175.52	48.91	58.39
Education	3.57	21.60	31.38	12.62	12.81
Feeder roads	10.51	53.85	72.82	30.49	33.77
Murram roads	4.08	11.88	14.80	9.77	9.70
Tarmac roads	2.59	13.12	62.92	9.39	9.73
Health	2.60	6.15	5.95	3.46	4.60

Source: S. Fan, X. Zhang, and N. Rao, *Public Expenditure, Growth, and Poverty Reduction in Rural Uganda*, DSG Discussion Paper No. 4 (Washington, DC: IFPRI, 2004).
Note: n.s. indicates statistically insignificant.

1. Agricultural research, education, and rural infrastructure are the three most effective types of public spending for promoting agricultural growth and reducing poverty.
2. Limited evidence from China and Uganda indicates that it is often the low-cost types of infrastructure that may have highest payoffs in terms of growth and poverty reduction per unit of investment. In the case of China, rural road investment not only contributes to rural growth and poverty reduction, but also to urban growth and poverty reduction.
3. Regional analysis conducted for China, India, Thailand, and Vietnam suggests that more investments in many less-developed areas not only offer the largest poverty reduction per unit of spending, but also lead to the highest economic returns. In Africa, however, such regional trends are not as prevalent, with most regions having comparably high returns in terms of poverty reduction regardless of development status. This implies an overall underinvestment of public resources in Africa.
4. Government spending on anti-poverty programs generally has only a small impact in reducing poverty, mainly due to inefficient targeting and misuse of the funds. Although many

governments have realized the seriousness of the problem, it is essential to improve the targeting of funds to the poor, or otherwise use the investments to improve rural education and infrastructure, which promote long-term growth and hence a long-term solution to reducing poverty.

5. Government spending on irrigation played an important role in promoting agricultural growth and reducing poverty in the past, but today this type of spending has smaller marginal poverty and growth returns for many Asian countries. Instead of increasing investment in irrigation, the efficiency of the current public irrigation system should be improved by reforming public institutions and governance.

The case studies also indicate that different spending priorities are needed during different stages of development; "one-size-fits-all" strategies do not work. During the first phase, strategies should focus on reducing widespread poverty through broad-based economic growth that reaches rural areas. In subsequent phases, more direct attention should be focused on lagging sectors and regions, as well as on poverty at the community and household levels, in order to reduce the poverty and income inequalities that arise and persist despite reform.

Most Sub-Saharan African countries are still in the first phase of development. Investments in support of economic growth remain central to reduction of their mass poverty. In these countries, governments have the central responsibility to forge a well-sequenced and coherent growth strategy and determine what public investments are required. Public investment in infrastructure and agriculture are the main areas needing attention. In recent years, some African governments have started to make progress. For instance, Ethiopia and Nigeria recently increased their public investments in agriculture and rural areas.

Countries such as China, India, Vietnam, and Thailand have successfully completed the first phase of poverty reduction and now need to begin to address regional inequities and poverty issues at the household level. China has traditionally favored a sectoral and regional targeting approach (such as employment programs) to deal with rising inequalities but has recently expanded to more household- and community-targeted programs. India, in contrast, has concentrated on targeting specific sections of the population and has recently expanded employment programs, too. India's experience shows that the use of a variety of targeted programs directed to specific sections of the poor can help improve targeting compared with the broader income- or area-based approaches.

For Further Reading: S. Fan, L. Zhang and X. Zhang, "Investment, Reforms, and Poverty in Rural China," *Economic Development and Cultural Change* (Vol. 52, No. 2, 2004); S. Fan, X. Zhang, and N. Rao, *Public Expenditure, Growth, and Poverty Reduction in Rural Uganda*, DSG Discussion Paper No. 4 (Washington, DC: IFPRI, 2004); S. Fan, P. Hazell, and S. Thorat, "Government Spending, Agricultural Growth, and Poverty in Rural India," *American Journal of Agricultural Economics* (Vol. 82, No. 4, 2000); S. Fan, P. Hazell, and T. Haque, "Targeting Public Investments by Agroecological Zone to Achieve Growth and Poverty Alleviation Goals in Rural India," *Food Policy* (Vol. 25, No. 4, 2000); S. Fan and C. Chan-Kang, *Road Development, Economic Growth, and Poverty Reduction in China*, Research Report No. 138 (Washington, DC: IFPRI, 2005).

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