

GROWTH AND POVERTY IMPACTS OF AGRICULTURE RELATED PUBLIC EXPENDITURES

Executive Summary

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Public investments can play an important role in achieving higher growth and poverty reduction in many developing countries. Since public resources are scarce, prioritizing public spending is essential. Information on relative returns to different types of spending in different locations can provide important guidance for policymakers and other stakeholders in deciding their investment priorities.

With so many poor linked to and dependent upon agriculture, agriculture and rural development are seen as central components of any strategy for reducing poverty and hunger. Since the types of public spending that have the greatest impact on agricultural and rural development come from within as well as outside the agricultural sector, the types of spending considered in this document extend beyond the agricultural sector. The objective of this paper is therefore to synthesize and review major methodologies and findings related to the poverty reduction and economic growth impact of public expenditures within the framework of agricultural and rural development.

I. Methodologies

There have been numerous studies to assess the impact of public investment on growth and to a less extent on poverty reduction. However, these studies have several methodological weaknesses. First, most of the past studies included only one type of government investment in their analysis. For example, Alston et al (2000) reviewed case studies on the returns to agricultural R&D investments and found that almost none of these studies considered other investments such as investments in infrastructure, irrigation, and rural education. Failing to include other investments will not only make it difficult to rank the effects of different expenditures on both growth and poverty reduction but will also lead to biased and usually overstated estimates of the included investments. Moreover, given the cross-sectoral linkages involved in the development process, the promotion of agricultural growth requires a strategy that emphasizes spending within as well as for the agricultural sector. In other words, public spending within and outside of the agricultural sector have the potential to contribute to agricultural growth on the same level if not more than public spending in agriculture.

Second, past methodologies ignored the multiple channels through which public investments affect economic growth and poverty (Ahluwalia, 1978; Saith, 1981; Gaiha, 1989; Ravallion and Datt, 1995; Datt and Ravallion, 1997). For example, improved rural infrastructure will not only reduce rural poverty through improved agricultural productivity, but also affect rural poverty through improved wages, non-farm employment and migration.

Third, most research only examined public spending in terms of general economic returns and did not include measures of poverty-reduction effects, subscribing, for instance, to the belief that the direct impact of investments such as infrastructure was not a means for poverty reduction. More specifically, many scholars have demonstrated relationships between government spending and economic growth (Aschauer 1989; Barro 1990; Tanzi and Zee, 1997; Kessides, 1993; Canning and Bennathan, 2000) but only a few studies directly linked investments to poverty reduction (e.g. van de Walle, 2003; Torero and von Braun, 2006).

In order to analyze systematically the impact of different types of public investment on both agricultural growth and poverty reduction, researchers in recent years have used methodologies based on a more comprehensive framework of analysis. It differs from the previous, single-equation studies in several aspects. First, most types of public investment and expenditures are included in the assessment to avoid upward bias in the estimates of returns to specific investments (e.g. agricultural research), and to compare and rank returns of various types of investment. Second, the model has the ability to identify different channels through which government investments affect growth, inequality, and poverty. Understanding these different effects provides useful policy insights to improve effectiveness of government poverty alleviation strategies. Third, the model permits calculation of economic returns measured by the number of poor people raised above the poverty line for additional units of expenditure on different items.

II. Impact of public spending

We review the select case studies below. The criteria for selecting these case studies include: (1) most of spending types should be included, (2) multiple channels through which public spending affects poverty have to be considered, and (3) the studies have to be peer reviewed.

India

The results from India show that additional government expenditure on roads is found to have the largest impact on poverty reduction as well as a significant impact on productivity growth. For every one million Rupees spent on rural roads, 124 poor would be lifted above the poverty line, the largest poverty reduction among all types of investment. One Rupee invested in rural roads would generate more than 5 Rupees in returns in agricultural production, second largest production growth effect, only next to agricultural R&D. It is a dominant “win-win” strategy. Additional government spending on agricultural research and extension has the largest impact on agricultural productivity growth with a benefit-cost ratio of 13, and it also leads to large benefits for the rural poor only next to rural road investment. It is another dominant “win-win” strategy. Additional government spending on education has the third largest impact on rural poverty reduction, largely as a result of the increases in non-farm employment and rural wages that it induces.

Additional irrigation investment has similar impact to education investment on growth in agricultural productivity and only a small impact on rural poverty reduction, even after trickle down benefits have been allowed. Additional government spending on rural and

community development including Integrated Rural Development Programs (IRDP) contributes to reduction in rural poverty, but its impact is smaller than expenditures on roads, agricultural R&D, and education. Additional government expenditures on soil and water conservation and health have no impact on productivity growth, and their poverty effects through employment generation and wage increase are also small.

In another study, Fan and Hazell (2000) attempted to estimate the returns of various public investments in different regions of India using district level data. The districts were classified into three categories: irrigated, high-potential rainfed, and low-potential rainfed. Districts were defined as irrigated if more than 25 percent of the cropped area was irrigated. Rainfed districts were subdivided into high- and low-potential areas according to their agroecological characteristics. Using district-level data for 1970–95, an econometric model was estimated to measure the impact of different types of public investments on agricultural production and rural poverty. The model was then used to calculate the impact on growth and poverty of another unit of each type of investment by land type.

For every investment, the highest marginal impact on agricultural production and poverty alleviation occurs in one of the two rainfed lands, while irrigated areas rank second or last. Moreover, many types of investments in low-potential rainfed lands give some of the highest production returns, and all except education have some of the most favorable impacts on poverty. These results strongly support the hypothesis that investments in less-favored areas are becoming win-win opportunities and that more investment should now be channeled to less-favored areas

China

Using provincial-level data for 1970–2000, Fan, Zhang and Zhang. (2004) developed a simultaneous equations model to estimate the effects of different types of government expenditure. The results show that government's production-enhancing investments, such as agricultural R&D, irrigation, rural education, and infrastructure (including roads, electricity, and telecommunications) contributed not only to agricultural production growth, but also to reduction of rural poverty and regional inequality.

However, variations in the magnitude of the effects are large among different types of spending and across regions. Based on actual investments in 2000 and the parameters estimated from the model, the authors calculated the marginal returns of various investments to growth in agricultural and nonfarm production and reduction of rural poverty and regional inequality. These returns were calculated for the nation as a whole and for three different economic zones. Since the estimated returns are recent, they can serve as a direct input into the current policy debate.

Government expenditure on education had the largest impact in reducing rural poverty and regional inequality and had significant impact on production growth. Increased rural nonfarm employment was accountable for much of this poverty- and inequality-reducing effect. Government spending on agricultural R&D substantially improved agricultural production. In fact, this type of expenditure had the largest impact on agricultural production growth, which is much needed to meet the increasing food demands of a richer and larger population. Benefits of agricultural production growth also trickled

down to the rural poor. The poverty-reduction effect per unit of additional agricultural R&D investment ranked second after investment in rural education.

Government spending on rural infrastructure (roads, electricity, and telecommunications) had substantial impact in reducing poverty and inequality, owing mainly to improved opportunities for nonfarm employment and increased rural wages. Investments in irrigation had only modest impact on agricultural production growth and even less impact on rural poverty and inequality, even after trickle-down benefits were allowed for. A striking finding is the minimal impact of specifically targeted government anti-poverty loans. In fact, the poverty reduction impact of these loans was the least of all the types of government spending considered in the study.

Disaggregating the analysis into different regions reveals that, for all types of government spending, returns to investments in poverty reduction were highest in the west (less-developed region), while returns in agricultural production growth were the highest in the central region (more developed 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 worsened existing large regional inequalities.

However, the government public investment variable is highly aggregated. While the total length of roads or average years of schooling is a useful indicator of the road infrastructure availability or education level in a country, it is important to account for quality differences because different types of roads or education (e.g. rural vs. urban) can have very different economic returns and poverty impacts. Second, most studies have only focused on rural poverty since urban poverty has only recently emerged as an important and growing problem. To address these limitations, Fan and Chan-Kang (2005) disaggregated road infrastructure into different classes of roads to account for quality. The study also estimates the impact of road investments on overall economic growth, urban growth, and urban poverty reduction, in addition to agricultural growth and rural poverty. The most significant finding of their study is that low quality (mostly rural) roads have cost-benefit ratios for national GDP that are about four times larger than the cost-benefit ratios for high quality roads. Even in terms of urban GDP, the benefit/cost ratios for low quality roads are much greater than those for high quality roads. As far as agricultural GDP is concerned, high quality roads do not have a statistically significant impact while low quality roads are not only significant but generate 1.57 yuan of agricultural GDP for every yuan invested. Investment in low quality roads also generates high returns in rural nonfarm GDP. Every yuan invested in low quality roads yields more than 5 yuan of rural nonfarm GDP. In terms of poverty reduction, low quality roads raise far more rural and urban poor above the poverty line per yuan invested than do high quality roads.

Uganda

The above Asian case studies have generated interesting debates on the priorities of government investment, and have led several countries to rethink their current investment strategies for future investment. However, all of these studies were done on Asia and secondary level data were used, and the literature on the impact of public investment in

Sub-Saharan Africa is sparse. One exception is a study in Uganda. Using district- and household-level data for 1992, 1995 and 1999, Fan, Zhang, and Rao (2004) estimated the effects of different types of government expenditure on agricultural growth and rural poverty in Uganda following the multiple equations system described in the previous section.

For the country as a whole, the results from the estimated poverty equation showed that growth in labor productivity, rural wages, and non-farm employment are all important factors in explaining rural poverty in Uganda. In contrast, rural wages did not significantly affect rural poverty. This may be because there is surplus rural labor, consistent with the so-called efficiency wage theory.

Turning to the marginal returns of different types of government expenditures on growth and reduction of rural poverty, the authors found that all types of public spending reduce poverty while increase agricultural production in Uganda. However, there were sizeable differences in production and poverty reduction gains among expenditure items. For the country as a whole, government expenditure on agricultural extension and research has the highest return to labor productivity and to poverty reduction, followed closely by feeder roads investment. Education ranked third in terms of productivity and poverty reduction effects, whereas health had the smallest impact.

Large regional variations are also observed in the marginal impact of public expenditures on poverty alleviation. Uganda is characterized by a variety of agroclimatic conditions and is commonly divided into 4 regions. The central region enjoys good rainfall and is the most developed region in terms of social and economic indicators. The poverty incidence in central Uganda is the lowest among all regions. Eastern Uganda is the second most developed region in terms of social and economic indicators but rural poverty is high, averaging 38.4 percent in 1999. The western region has mountainous areas where the altitude permits cultivation of temperate fruits, vegetables, and some traditional food crops. The rural poverty rate averaged 29 percent in 1999. The northern region is the poorest of the four and is home to 67 percent of Uganda rural population. Incidentally, this region has also been struggling with war between the government and rebels for a long time.

Regional disaggregation reveals that, for all types of investments except health, the returns in terms of increased agricultural productivity is the highest in the western region. For agricultural extension, the eastern region has the lowest return, while the central and northern regions fall in between. For education and roads, the central and northern regions have the lowest return while the eastern region ranks in the middle. In terms of poverty reduction, the northern region, which is Uganda poorest region, has the highest returns except for health, whereas for all types of investments, the poverty impact was the smallest in the central region.

III. Conclusion and Knowledge Gaps

A large body of literature shows that public investments in rural areas have contributed significantly to agricultural growth and rural poverty reduction. These investments have also contributed to urban poverty reduction through growth in the national economy and

lower food prices. Without these investments, agricultural growth and national economic growth would have been much slower, and there would be much more rural poor and urban poor in many developing countries. Despite of these successes, there are still more than 1.2 billion rural poor, and governments in developing countries routinely cut budgets in rural areas. Many African countries are particularly affected.

Since significant increases in public rural investment seem unlikely, countries will have to give greater emphasis to using their public investment resources more efficiently. This requires better targeting of investment to achieve growth and poverty alleviation goals, and 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 government to make sound investment decisions. Without such information, it is difficult for governments to hone in on future investment priorities to achieve national development goals. Despite vast differences in economic systems, natural sources endowments, socio-economic conditions, and sizes, these case studies offer some important lessons:

1. Returns to public investments vary drastically across different types of investment and regions even within the same country. This implies that there is a great potential for more growth and poverty reduction even with the same amount investment if these public resources can be allocated optimally. This strongly suggests that it is important to include all (or most) types of public investment when assessing their impact on growth and poverty reduction. To date, very few studies have done so.
2. Various studies that include only one type of spending, and more importantly, a few case studies that include most of government investment, all concluded that agricultural research, education, and rural infrastructure are the three most effective public spending items in promoting agricultural growth and poverty reduction.
3. Limited evidence from China and Uganda also indicates that it is often the low quality/low cost types of infrastructure that may have highest pay off per unit of investment in growth and poverty reduction. In the case of China, rural road investment not only contributes to rural growth and rural poverty reduction, but also to urban growth and urban poverty reduction.
4. The trade-off between agricultural growth and poverty reduction is generally small among different types of investments and between regions. For agricultural research, education, and infrastructure development, they have large growth impact as well as large poverty reduction impact.
5. Regional analysis conducted for China and India 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.
6. Government spending on anti-poverty programs generally has small impact on poverty reduction, mainly due to inefficiency in its targeting and misuse of the funds. Although many governments have realized the seriousness of the problem, more efforts are needed to better target the funds to the poor, or otherwise use the

investments to improve rural education and infrastructure, which promote long-term growth and thereby offer a long-term solution to poverty reduction.

Despite vast literature on public investment and rural poverty reduction, there is much to be done in the future. First, developing countries must pay a higher attention to systematically compile public investment data in rural areas. Various international agencies such as the World Bank, the Food and Agriculture Organization, and the International Monetary Fund have made efforts to help developing countries in establishing national statistical systems to collect, compile and monitor development indicators related to agricultural production and inputs, income, employment, wages, and poverty. But these efforts seldom include rural infrastructure, technology, education and related government investment. Without such information, it is difficult to assess potential holistic impacts of government intervention on agricultural growth and poverty reduction.

Second, a general-equilibrium analysis is needed to show how government investment in rural areas affects not only the agricultural sector and rural areas, but also other sectors and cities. To date, most of the studies conducted are single-sector, partial-equilibrium analyses, which do not have the ability to track general-equilibrium and societal effects.

Third, how to finance needed public investment in rural areas deserves more attention. There are two major means of financing expenditures for public goods - general government finance (for example, taxes) and cost recovery (for example, user fees) for service provision. Importantly, financing of public expenditures has important implications for efficiency and equity.

Fourth, an analysis of the political and institutional context of public investments and conditions for efficient provision of public goods and services is also much needed to improve efficiency of public investments. In particular, how governments can design mechanisms (policies, regulations, fiscal systems) to mobilize public resources to invest in rural areas deserves much more research attention in the future. How to reform public institutions by improving incentives, accountability, human capital, and management is also an important research issue.