



The Impact of Research-Led Agricultural Productivity Growth on Poverty Reduction in Africa, Asia and Latin America

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Summary. — Twenty-percent of the world's population, or 1.2 billion live on less than \$1 per day; 70% of these are rural and 90% are in Asia and sub-Saharan Africa. Research-led technological change in agriculture generates sufficient productivity growth to give high rates of return in Africa and Asia and has a substantial impact on poverty, currently reducing this number by 27 million per annum, whereas productivity growth in industry and services has no impact. The per capita “cost” of poverty reduction by means of agricultural research expenditures in Africa is \$144 and in Asia \$180, or 50 cents per day, but this is covered by output growth. By contrast, the per capita cost for the richer countries of Latin America is over \$11,000.

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1. INTRODUCTION

The World Development Report (World Bank, 2001) summarizes the poverty surveys that the Bank has conducted, showing that almost half of the world's six billion people live on less than \$2 per day, and a fifth, or 1.2 billion on less than \$1 per day. Poverty alleviation targets have become central to the policies of governments and aid agencies. For example, the White Paper on International Development (UK Government, 2000) states that the Department for International Development (DFID) it is committed to halving the number of people living on less than \$1 per day, by 2015.

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More than 90% of these 1.2 billion live in South Asia, East Asia and sub-Saharan Africa (SSA) and Chen and Ravallion (2000) show that although poverty has declined from 1987–98, especially in Asia, it has increased substantially in sub-Saharan Africa. Between two-thirds and three-quarters live in rural areas (estimates vary from 62%, CGIAR, 2000, to 75%, IFAD, 2001). The poorest have little or no land and they gain disproportionately from the employment generated by agricultural growth and from lower food prices, as do the urban poor, who spend much of their incomes on food. Thus, agricultural growth has a powerful impact on poverty, because it helps all poor people, whereas growth in the manufacturing and service sectors does not.

The literature provides theoretical reasoning and piecemeal empirical evidence on the impact of agricultural growth on poverty reduction, mostly for single countries. But, the World Bank \$1 per day poverty survey and inequality data, used in the World Bank growth studies, has not been used in investigating the impact of agricultural productivity growth. There is now a pooled set of 121 observations on 59 countries, which in combination with other variables, especially on agricultural research and development (R&D) expenditures, allows estimation of the poverty impact of agricultural R&D, for a broad selection of developing countries. This paper first uses all the available observations to establish that agricultural productivity has a significant impact on \$1 per day productivity, whereas productivity in industry and services does not. Since these simple models are bound to be misspecified, other relevant variables are added, beginning with inequality, and in order to make key variables endogenous, a four-equation model that incorporates causal chains is developed, which allows inclusion of as many of the relevant variables as is possible. The causal chains cover all the relationships from agricultural R&D, to agricultural productivity growth, to GDP per capita, to inequality and poverty reduction.

Section 2 reviews the literature and Section 3 describes the data, before progressing to simple models, which show that agricultural productivity growth has a substantial impact on poverty reduction, whereas productivity growth in industry and services does not. Section 4 introduces the causal chain model and presents the results. Section 5 shows that investment in agricultural R&D raises agricultural value added sufficiently to give very satisfactory rates

of return, in both Africa (22%) and Asia (31%), but not in Latin America (–6%). Thus, in two continents, agricultural R&D pays for itself, as increased productivity results in broad-based growth, which reduces poverty. A 1% increase in yields reduces the numbers living in under \$1 per day poverty by six and a quarter million, with 95% of these in Africa and Asia. Alternatively, the cost of removing one individual from \$1 per day poverty in Africa is \$144, in Asia \$180, but in Latin America it is over \$11,000.

2. RESEARCH-LED AGRICULTURAL GROWTH AND POVERTY REDUCTION

The proposition that technology driven agricultural growth reduces poverty is not new. Lipton (1977) argued that since the majority of the poor live in rural areas and derive most of their income from their labor, agricultural growth based on the introduction of labor-intensive technologies is particularly effective in reducing poverty in developing countries. The poor have little land or capital, so their incomes depend on increased employment. The majority produce nontradable, nonfarm goods and services (nondurable consumer goods sold by small shops, market trading services, hoes, ploughs and other simple capital goods). Mellor (2001) argues that agricultural productivity growth reduces poverty so effectively because it generates income for poor farmers, which is also the source of increased demand for these goods and services. This reduces urban poverty as well, by slowing migration to the urban areas and since food is only partially tradable, productivity increases in agriculture also result in lower food prices that primarily benefit both the rural and urban poor.

Thus, research-led technological change has propelled famine-plagued, food insecure Asian countries into food self-sufficiency (Kerr & Kolavalli, 1999). Agricultural productivity growth drives pro-poor growth, benefiting poor farmers and landless laborers by increasing both production and employment. It benefits the rural and urban poor through growth in the rural and urban nonfarm economy.¹ It leads to access to crops that are high in nutrients and empowers the poor by increasing their access to decision-making processes, increasing their capacity for collective action, and reducing their vulnerability to shocks, through asset accumulation (Hazell & Haddad, 2001).

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