BIG ECONOMIC BENEFITS FROM THE ‘GREEN REVOLUTION’ IN AGRICULTURAL SCIENCE: New evidence of high-yielding crops boosting growth in developing countries

The spread of high-yielding crop varieties developed through conventional plant breeding may have led, directly or indirectly, to four-fifths of all economic growth achieved in the developing world during the 40-year period from 1960 to 2000. That is the central finding of research by Casper Worm Hansen, Douglas Gollin and Asger Moll Wingender, to be presented at the annual congress of the European Economic Association in Geneva in August 2016.

The Green Revolution refers to high-yielding crop varieties developed primarily in public sector institutions, and distributed to farmers for free or made available at low cost. The new study considers 11 crops – rice, wheat, maize, sorghum, millet, barley, potato, cassava, dry beans, groundnut and lentils – and finds that in an average developing country, the Green Revolution led to an increase in per capita income of 47% between 1960 and 2000.

Co-author Casper Worm Hansen comments: ‘What we are finding is far more than the direct effects that would have come from producing more agricultural commodities. We are instead picking up broader and deeper changes in these economies. The lesson is that successful agricultural science can have a really large payoff in terms of macroeconomic outcomes.’

More...

A new study by economists from the University of Copenhagen and Oxford University finds that the Green Revolution in agricultural science has led to significant and long-lasting increases in income for the world’s developing countries. The study focuses on the spread of high-yielding crop varieties developed through conventional plant breeding in the period 1960-2000. The study finds that growth induced by the Green Revolution may have led, directly or indirectly, to as much as four-fifths of all economic growth achieved in the developing world during this period.

The study considered high-yielding varieties of 11 crops: rice, wheat, maize, sorghum, millet, barley, potato, cassava, dry beans, groundnut and lentils. These varieties were developed primarily in public sector institutions, rather than by commercial firms. Seeds and planting materials were typically distributed freely to farmers or made available at very low cost. Farmers in turn saved and reproduced the seeds themselves, and many varieties diffused rapidly across large areas of the developing world.

For example, a single rice variety, IR8, which was released in 1965 by the International Rice Research Institute, covered 10% of Asia’s rice area by 1969. By 1980, high-yielding rice varieties were planted on about 16 million ha – around 40% of Asia’s rice area.

The diffusion of these high-yielding varieties was widely heralded at the time for their impact on crop yields and hunger, and the wheat breeder Norman Borlaug won the Nobel Peace Prize in 1970 for his role in developing and promoting these improved varieties. But the Green Revolution later became a target of criticism over claims that
the new technologies contributed to a number of negative social and environmental impacts.

The new study documents the very long-run economic impacts of the Green Revolution. Although previous research has examined the effects of the Green Revolution on individual farmers and communities, the new study focuses on macroeconomic impacts.

The study documents that the spread of high-yielding varieties closely followed geographical and climatic patterns. It then shows that the countries where agro-ecological conditions were most favourable for high-yielding varieties achieved rapid income growth in the succeeding period. The analysis controls for a wide range of factors that might have affected growth rates.

The authors also find that the increases in income were not undercut by increases in population: on the contrary, the Green Revolution was associated with declining fertility rates for women – suggesting that the growth effects were relatively widely distributed. The study finds that in an average developing country, the Green Revolution led to an increase in per capita income of 47% between 1960 and 2000, implying that the direct and indirect effects of the Green Revolution may have accounted for a large fraction (about 80%) of the total growth in incomes achieved during that period.

One of the study’s authors, Casper Worm Hansen, an associate professor at the University of Copenhagen, notes that the methods of the study do not allow for a clear understanding of the channels through which the Green Revolution drove economic growth:

‘We know that in many poor countries, agriculture is a major sector, so it seems reasonable that these scientific advances led to growth. But what we are finding is far more than the direct effects that would have come from producing more agricultural commodities. We are instead picking up broader and deeper changes in these economies.’

‘The lesson is that successful agricultural science can have a really large payoff in terms of macroeconomic outcomes.’

The study’s other authors are Douglas Gollin, from Oxford University, and Asger Moll Wingender, also from the University of Copenhagen.

ENDS