Human Capital Investment in Agriculture for Competitiveness: Discussion Report Section VI

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Before beginning a review of his paper let me say that Paul Schultz has written a number of important articles (cited in his references) dealing with the contribution of several aspects of human capital to economic growth and development, and I would encourage you to read them. His work is more general than his presentation for this conference suggests.

Schultz focuses here on the impact of schooling, health and migration (three important types of human capital), on wage rates of a sample of male and female wage earners from Ghana and Côte d’Ivoire (1985–9). He uses a flexible hedonic wage function to relate the characteristics of an individual to the hourly wage rate. In this framework, he tests for endogeneity of human capital variables and, when he finds it, he uses instrumental variable estimators in an attempt to reduce possible simultaneous equation biases in the estimated coefficients. The quality of new estimates is, however, affected by the quality of the instruments used to forecast the ‘endogenous’ variables.

First, Schultz finds that the marginal contribution of individuals’ education and migration experience are positive and large to their wage and not much affected by the inclusion or exclusion of other regressors. His finding of a tendency for increasing marginal effects of years of schooling on wages is not surprising, given that the mean years of schooling are one to eight years over the age groups. What does an average of one or two years of schooling mean? It is my experience that an individual must have four good years of formal schooling to become permanently literate, so one to three years of schooling does not really provide much long-term skill that would affect labour productivity. The fourth, fifth and sixth years seem to make a big impact. Second, effects of height and body mass seem to be endogenous, and hence the use of actual versus instrumental variables for these variables in the wage equation makes a significant difference for the size and, in some cases, the direction of the impact on the wage. I am, however, sceptical of an adult’s height, which is determined years earlier, possibly being endogenous to the adult wage. Third, the coefficients of the wage equations differ across men and women, and the differences are especially large for height and body mass. It would, however, be unusual for these parameters to be the same. Fourth, the parameters of the wage equation differ significantly across the two countries. This outcome would not be expected if these individuals were in the same labour market. A common labour market could occur if individuals could move relatively freely between the countries. Fifth, in simula-
tion experiments where each of the four human capital variables is increased by one standard deviation, the health variables account for 50 per cent of the change in the wage. The analysis, however, is silent on the cost of obtaining these changes. It would be more interesting to compute the marginal rate of return on alternative human capital investments.

More generally, what do I think of Schultz’s approach and these results? My basic reaction is that there is too much emphasis on health, given the crudeness of the measures and the weak story about the way height and mass affect labour productivity and wages, and too little emphasis on the contributions of other forms of human capital to international competitiveness and to economic growth. First, the conceptual model of the way height and body mass affect labour productivity and wage rates is unspecified. For manual labour, it is easy to visualize how height, which is related to leverage, and body mass, which is related to strength and endurance, would be important. For skilled labour, the possible connections are much more difficult to see. One hypothesis is that height (and mass) is related positively to general health status. If so, then reduced job absenteeism and increased endurance might occur. Hence employers would be willing to pay taller skilled workers in Ghana and Côte d’Ivoire more because they get more work done in any time interval.

Second, how is height acquired? The paper is silent on this topic, too, although more information exists in the literature. There seem to be three major factors: inherited genes for height/mass, nutrition and public policy. It is well known that height is a heritable attribute, but it has been more difficult to see how inheritance would play a role in explaining trends over time in the height of young adults. One possibility here is that, as young people go to school longer, they delay marriage and travel farther from home to go to schools and to work. Thus they meet people who on average grew up farther away. These factors add up to individuals being in a geographically larger and genetically more diverse spouse market, and it is genetic diversity in humans which is thought to be a major factor affecting longevity and, possibly, height.

Nutrition of mothers and children also matters. The nutrition of pregnant women affects the birth weight of their children and the diet of children as they approach maturity/puberty affects the size of the rapid growth spurt. There is considerable evidence that mothers’ health is positively related to their babies’ birth weight, and some evidence that birth weight has a permanent effect on frequency of later illness in older children. Just before puberty, teenagers need diets high in calcium, protein and calories in order to get the nutrients and energy for bones to grow and muscle and fat deposits to occur.

Across countries, government policies must also play a major role. Food price policies, especially for milk and carbohydrates, affect the rate of consumption of these foods. Public health measures have a major impact on drinking water and food quality, and waste disposal and treatment. At a point in time, policy differences across countries must be part of the explanation for cross-country differences in life expectancy at birth. For example, China and sub-Saharan Africa, which have similar GNP per capita levels, have life expectancies of 71 and 52 years, respectively, and the United States (and Canada) and Japan, which are many times richer, have life expectancies of 77–9, which are only slightly larger than for China.
Finally, is there significant long-term growth potential in the health characteristics used by Schultz? It is difficult to say, because we know very little about the impact of height and body mass on wage rates in developed countries, at least relative to schooling and experience. There is a large amount of accumulated evidence of the positive effects of formal schooling and experience on individuals’ wage rates in developed countries. However, no large US micro data set contains wage rate and height or body mass data of individuals, so we do not know whether this relationship holds in the United States or in any other developed country. If it does not, then the growth potential will certainly be much more limited. If we assume that health status does matter for productivity in developed countries, then the potential for accumulation on a per capita basis is limited by finite life, just as with education and experience. Hence health has some potential, but probably less potential than education and experience, as an investment for future competitiveness and growth.

Intellectual capital (the stock of innovations measured by patents, designs, books and journal articles), is a form of capital having considerable potential. Intellectual property is intensive in the use of human capital services, is non-rival in use, and has almost an infinite life. Hence the accumulation of intellectual property on a per capita basis has unbounded potential.

Professor Schultz has placed human health at the forefront of human capital types that are important for international competitiveness. I think that he is underestimating the potential of other types of human capital. There is a richer approach following from the two centuries-old idea that ‘knowledge is power’ (Francis Bacon). Knowledge obtained from formal schooling, work experience and advances in science and technology is a powerful tool for growth of per capita income and for international competitiveness. Some 30 years ago, T.W. Schultz emphasized that the primary resource of an area is the human time of the adult population of the area, and the productivity of their time can be enhanced by human capital investments (Schultz, 1961). More recently, endogenous growth literature has taken a strong human capital emphasis. Lucas (1993) emphasizes human capital in the form of accumulated work experience or ‘learning-by-doing’ in an open economy where countries specialize in the production and international trade of a commodity in which they have a significant comparative advantage. The approach, however, that I think has the greatest potential is one portrayed by Romer (1990). In this model, Romer emphasizes human capital-based technical change through advances in knowledge from R&D activities. There are three types of inputs in Romer’s model: labour, which is the services provided by healthy physical bodies to do work including good hand–eye coordination; human capital, which is skills obtained from schooling and work experiences; and non-human capital, which is produced with unique designs or intellectual property and forgone consumption. All labour and non-human capital are used in final goods production. The R&D sector uses only human capital and the previously produced stock of intellectual property to produce innovations. Resources are allocated to maximize consumers’ intertemporal utility, subject to resource and technology constraints. The model yields some solutions containing steady growth in per capita income which is driven by endogenous technical change.
Although the econometric research testing this model is in the primitive stages relative to the conceptual foundations, the model has real potential. It predicts that an economy having a large stock of human capital will experience faster growth in per capita income than one with a smaller stock, and that for a given country an increase in the stock of human capital will increase the rate of growth. If the stock of human capital is too low, no R&D activity should be undertaken and all human capital should be allocated to final goods production. However, no growth occurs. Economies that are open to trade in goods and ideas may have access to a larger relevant stock of human capital and experience more rapid growth than closed economies. Economic growth is uncorrelated with the rate of population growth.

Developing countries have poor institutions for dealing with intellectual property (Evenson, 1990). They are of the type that facilitates pirating innovations, but access to a wide range of innovations occurs only through more sophisticated arrangements. These include international joint ventures, licensing, and trade and domestic R&D of the imitation and adaptive research nature. Very little technology is useful through direct transfers. The recent GATT negotiations have made clear that the developed countries are getting tough on pirating intellectual property. The world contains a large amount of potentially useful intellectual property, but the developing countries as a group are not effectively tapping it.

It is my belief that Romer's model is a useful starting-point to understanding and explaining differences in growth rates across regions (and over time). This includes the puzzle of why the real growth rate of sub-Saharan Africa has been so poor during the decade of the 1980s (~1.5 per cent per year) and of Central and South America (excluding Brazil) only slightly better (~0.7 per cent per year). On the other hand, some other regions did very well: for example, Mexico, Korea and China about 7 per cent, India about 4 per cent and all of Asia over 5 per cent. Note that population growth rates differ greatly across these regions. My hypothesis is that an explanation of these differences requires more that a story about health. It is a story that I believe depends heavily upon human capital broadly conceived and requires understanding the contributions of education, experience, health, migration, intellectual property, openness to ideas and trade, water use and other things, including political-economic stability. I would be happy to share some preliminary findings with anyone who wishes to make contact.

Finally, I present the hypothesis that, if a region or nation expects to experience positive long-term economic growth (per capita) or improved international competitiveness, there is no escape from placing the highest priority on policies and incentives for raising the quality of its people through investments in human health and education and in the capacity to use effectively nature's generous but annually uncertain endowment of fresh water. By health investments, I do not mean primarily doctors and hospitals, but investments in public health (safe drinking water and food and human waste disposal and treatment) and health produced by households and families. Investments in women's education seem likely to reduce the long-run population growth rate, increase child quality (schooling and health) which will help raise the quality of the labour force of the future, and increase adult family members' health; and
added education for men will primarily raise the productivity of their time in the market and as farmers today. Their second priority must be to acquire access to new intellectual property, through international trade in goods, joint ventures and other technology transfer methods, and/or effective domestic research capacity. The developing countries are lagging three to five decades behind the developed countries in their intellectual property institutions and this is a hindrance to access and development of new intellectual property and to future economic growth and competitiveness.

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Professor Idachaba's central point in the debate on human capital development is that a favourable policy environment enhances the worker, allocative, innovative and marketing efficiency effects obtainable from human capital development through additional years of schooling, health care, information acquisition and extension contacts. The policy environment required to stimulate increases in productivity and optimum sustainable natural resource use includes human and institutional capacity and amenable policies at both sectoral and macroeconomic levels.

The human and institutional capacity which shapes the policy environment consists of the following:

1. The presence of elected representatives in policy-making institutions who are altruistic and fully conversant with the issues at hand, who are not rent seeking for personal, factional or ethnic gain, and who are able to formulate well considered policies that address local issues within a national perspective.

2. The existence of functional public policy institutions, such as farmers' organizations, collective community action groups and professional associations, able to advocate policies which address their concerns and capable of holding elected representatives accountable for their performance.

3. The availability of a cadre of policy advisors and programme implementors familiar with the policy parameters and issues, equipped with the requisite analytical skills, who are not constrained by demands to work on programmes and projects as directed by partisan interests.

Despite the value of Professor Idachaba's scheme, the issues under discussion should be seen in a broader context. The historical development of human capital and institutional development in the sub-Saharan countries need to be reviewed to understand the current state of affairs. In looking at the policy environment, one needs to pay far more attention to the capacity for efficient management of the agricultural sector. It is the area of agricultural policy analysis which is of crucial importance. Those who work in the relevant institutions need the skills to look at a variety of policy options, examine and quantify their impacts and recommend to policy makers the best possible

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