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AGRICULTURAL COMPETITIVENESS: MARKET FORCES AND POLICY CHOICE

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DISCUSSION REPORT SECTION VI

Wallace E. Huffman (USA)¹

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-

¹Iowa State University. Help was received from D. Gale Johnson and John Strauss.

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, 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 than 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.

Godfrey D. Mudimu (Zimbabwe)²

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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options for meeting desired objectives. That would enable policy makers and technocrats to anticipate outcomes from given actions.

There is concern that in sub-Saharan Africa agricultural policy analysis and management has not received adequate attention and investment in the past three decades. There has been lack of appreciation by policy makers of the role and contribution of efficient and effective management to the performance of agriculture, and of its contribution to general economic progress. This situation can be attributed to a number of factors which can be traced to sociopolitical developments in the post-independence era:

- (1) At independence, most of the countries started with weak institutional capacity for macroeconomic management, exacerbated by shortage of skilled personnel for policy analysis.
- (2) Most of the countries gravitated towards either military governments or one-party states characterized by lack of tolerance for opposition outside the established political systems. This weakened public policy advocacy and the capacities of independent farmers' organizations.
- (3) The bureaucratic structures which emerged tended to serve the interests of the political establishment. Civil service functionaries were accountable to the political systems and not the public at large. This limited the scope for policy analysis.
- (4) The state assumed direct control of the economy putting into place price controls, foreign exchange regulations, and wage controls. State-owned and state-run enterprises became the driving force of the economy. In the agriculture sector, parastatal marketing boards became the vehicle for implementation of agricultural strategies and organizing marketing and price controls. Market controls and bureaucratic regulations tended to discount the role of policy analysis. The accent was on administrative activities to effect controls and regulations. In the majority of cases, managers of the state-run enterprises were appointed on the basis of political connection and loyalty, rather than managerial capacity. Managers of the national agricultural institutions tended to be accountable, and pay patronage, to the political leadership and not the general public in the allocation of limited resources.

The sociopolitical environment in which policy-making institutions operated tended to place emphasis on administrative mechanisms, and the application of policy analysis was limited in scope and did not play a central role. Articulate policy analysis was not rewarded. At the same time, hundreds of people have been trained in policy analysis, often abroad. Many have opted to migrate temporarily or permanently to work in non-African or other African countries and international organizations because of factors such as inadequate remuneration and unsatisfactory working conditions, deterioration in the social-economic environment resulting from the poor performance of the economy, and political difficulties and hostilities.

Universities play a central role in human capital development. Unfortunately, those in sub-Saharan Africa have struggled over the years owing to shortage of funding, and political activities and interference resulting in

closures. The universities have not been able to attract and retain highly qualified lecturers because of unattractive salaries, a poor environment for teaching and research, and a general economic situation which makes it unattractive for professionals to remain in their countries.

Despite its importance, agricultural policy analysis has been identified as one of the weakest features of both the public sectors and university departments in the sub-Saharan countries. Departments of agricultural economics are often those which are the most prone to loss of qualified staff and the inability to recruit people with the desired training and skills. Many potential staff members have been sent to universities abroad on staff development programmes, but few have chosen to return because of the unattractive conditions at home and the opportunities offered to them as post-doctoral fellows by academic and research institutions abroad. Departments of agricultural economics therefore often lack adequate qualified personnel to teach some of the critical courses on a sustainable basis. Graduate programmes, through which skills for policy analysis and research could be nurtured, have been slow to develop or, if developed, they have remained nascent and in a majority of cases have been offered on an irregular basis owing to staff shortages. Even when programmes are offered, the teaching environment is less than ideal as the result of shortages of textbooks, inadequate computing facilities and absence of scholarships for qualified potential students. The tendency has therefore been to send students for graduate studies to institutions abroad through bilateral agreements and support from foundations. African countries are major contributors of trainee participants for policy analysis training courses and workshops offered by a number of universities under specialized training programmes in Europe and North America. A good number of these programmes are offered on a commercial basis to generate funding for the training institutions. The costs of sending individual participants are usually covered by bilateral donor projects. Local institutions remain starved of potential funding and are retarded in their ability to offer such training programmes because of staff shortage, but mostly because of the dictates of donor funding.

The consequence has been the failure of local institutions to meet the human capital development needs of their country. As a result, the majority of people who take up posts dealing with policy analysis in government hold BSc degrees only, and their knowledge base for policy analysis is inadequate. In many cases even some of the senior-level civil servants lack analytical skills and cannot assist their juniors. There is a dearth of localized case studies for teaching and research in agricultural policy analysis and agriculture sector management within the academic institutions and research organizations in the region. Skills and knowledge acquired from graduate studies remain underutilized because of lack of peer support, limited demand and inadequate funding for such research. If any research is undertaken, it is usually designed or generated and undertaken by researchers from abroad for their own academic needs or at the request of donors.

To fill the gaps in policy analysis skills, the tendency has been to rely on expatriate consultants and technical experts provided through donor funding and bilateral agreements. Local professionals are used in a subordinate capacity by the expatriate consultants to facilitate their work. Where policy-relevant

research has been undertaken, it has usually been conceptualized and initiated from outside institutions as part of their research mandates and their ability to compete for funding available from sponsoring foundations. The unfortunate aspect is that, as most of the involvement of local professionals is at individual level rather than institutional level, institutional facilities and time are used for individual gain. Institutional growth to create the capacity is thus curtailed. Another aspect is that local researchers lose the initiative to undertake policy-relevant work.

Owing to poor local remuneration and the attractive packages in regional and international organizations, senior academics, who are mature and experienced, often leave their institutions. This leaves no role models for younger and newly qualified staff who often have to come in to rebuild the departments depleted of staff. The departments, as a result, never stabilize or grow. On the other hand, in some situations, the newly qualified young staff have to embark on consultancies to beef up their incomes in order to afford a reasonable living standard. In general, being in an academic institution is less rewarding, financially, for younger professionals than being a trader. Such an environment does not encourage those on staff development study programmes to return. This is not the basis for building academic institutions.

African professionals in academic and public-sector institutions are also partly to blame for the state of affairs regarding human capital development over the past three decades. Within academic institutions, while the environment has been a limiting factor, local professionals have tended to lack vision and, in some respects, dedication to their responsibilities. For instance, as hinted above, personal gain has become the driving force at the expense of duty to the institution. Consultancies are undertaken using the time and material resources of the institutions without due compensation. Funding for research is personalized. All these resources could be pooled to finance departmental acquisitions. Little effort has been put into creating collaborative research activities and peer review and support among local professionals themselves. The preference is to work with former professors and other influential researchers in academic and research institutions abroad because of the gains that accrue to the individual and the prospects of being recommended for a position in an international organization. In such a situation, research agendas are set from abroad.

There are few mechanisms in place for exchange of research output and collaboration in curriculum development, except when it is facilitated through donor funding. Although the departments of agricultural economics are small, not much has been done to work on pooling resources to benefit from economies of scale. There are lots of small departments struggling to offer graduate programmes with meagre resources, instead of sending students to other institutions. Sabbatical leave opportunities at African institutions are not given prime consideration. In some situations expatriate staff, from other African countries, are treated in a discriminatory manner and as economic refugees or mercenaries. They are overloaded with teaching and denied opportunities that may arise for research funding and travel. The greatest danger facing some African institutions is the re-emergence of ethnic hostilities and discrimination among its academic staff. One hears of hiring and promotion according to ethnic considerations rather than competence.

Public-sector professionals stand accused of not giving due consideration to the expertise within their local institutions. Consultancies for projects are awarded to expatriate experts who in turn subcontract to local professionals or use the research of the locals as data sources. Graduate students from universities abroad are more likely to be accorded time and given access to data and confidential information or reports than local professionals. As a result, local staff are sometimes not well acquainted with the policy issues under consideration by their governments. The fact that universities were seen as centres of political opposition, and were therefore not trusted with information, has also contributed to this situation.

Though I have stressed the need for developing skills in analysis, it must not be supposed that this would necessarily be a sufficient condition for improving the policy environment. An efficient policy implementation capacity is also required. Both *ex ante* and *ex post* impact assessment and evaluation become critical in guiding managers in project selection and resource allocation. Trained human resources are needed to create the institutional base and capacity to formulate and implement agricultural and rural development programmes and projects. This calls for training and development of human resources, in public and private sectors, equipped with managerial ability. Technical scientists in managerial positions lack the basic understanding and background for management, as most often they are promoted on the basis of seniority and technical competence rather than their managerial track record. Management tools developed elsewhere need to be adapted for use in the region through training and applied research. Socioeconomists and technical scientists will need to work together in their application. Senior managers and policy makers and advisors will need to be sensitized to the application and usefulness of these tools and the information so generated. There is a dearth of relevant training in faculties of agriculture in the sub-region, particularly at the postgraduate level, since study programmes do not expose students to the principles of management, even at the most basic level.

My conclusion is that it is crucial for the region to develop the capacity for analysing its own economic problems and constraints and thus to come up with possible solutions. It has been widely observed that the nature of the economic crisis afflicting most of the African countries has been left to donor and outside agencies to diagnose, and thereafter offer prescriptions, without much critically synthesized inputs from local policy makers and implementors. The economic and political reforms now under way also require a cadre of public-sector administrators with a new style of management for planning and implementing programmes and projects.

The countries of the region will need to pool their limited resources and work collaboratively to develop human capital and institutional capacity. The challenge is to stimulate the development of key regional centres for research and teaching in policy analysis and agriculture sector management.

*Keiji Otsuka (Japan)*³

According to Hussain and Byerlee, productivity growth in Asian agriculture has visibly slowed down during the 'post-green revolution' period; hence a critical issue is how to restore and maintain the momentum of growth. One possibility is to improve farmers' management ability through education, and it is therefore both cogent and timely to review its role of enhancing productivity in Asian agriculture. My comments on the Hussain–Byerlee paper are divided into three parts: (1) general remarks concerning the plausibility of the central hypothesis that returns to education are high in the 'post-green revolution' period, (2) specific comments on supporting evidence, and (3) new evidence on returns to schooling in rice-growing villages in Asia in the late 1980s.

The authors' statements on the returns to education in the 'post-green revolution' period compared with the 'green revolution' are somewhat confusing. In their introduction they argue: 'in the new "post-green revolution" stage of agricultural development, there are high returns to improving farmers' information and skills to enhance the efficiency with which they use the new technology', whereas in their sub-section on 'Estimates of inefficiency in Asian farming' they assert: 'technical inefficiency is expected to increase with the introduction of "green revolution" types of technology and then decline in the "post-green revolution" period as farmers learn to use the new technology'. Literally, the authors seem to imply that returns to education are high in the 'post-green revolution' period, even though they were higher during the 'green revolution' period. They also argue that high returns to education in the 'post-green revolution' period arise from the complexity of new technologies, such as integrated pest management (IPM) and the dynamic technical and economic environment. But what are the major 'post-green revolution' technologies, other than IPM, which are complex and changing dynamically? Although the issue is empirical, my view is that returns to education accruing from improved farm productivity in the 'post-green revolution' period are low, simply because technology is stagnant and, hence, the ability to deal with disequilibria in the sense of Schultz (1975) is no longer highly valuable.

Is there solid empirical evidence indicating that returns to education in the 'post-green revolution' period are high? To answer this question, we must know when Asian agriculture actually entered this phase. Unfortunately, the authors do not indicate any time frame. Judging from the diffusion patterns of modern rice varieties and the trend of rice yield growth, the 'green revolution' in rice seems to have ended by the early 1980s in Southeast Asia (as well as in very favourable areas in South Asia, such as Punjab). It is not clear, however, whether the 'green revolution' has ended in many parts of South Asia where yield continued to grow in the early 1990s. It is therefore difficult to interpret statistical evidence on the relationship between education and production efficiency shown in Table 1, which summarizes the impacts of education on technical efficiency in farm production estimated by empirical studies conducted in the late 1970s and early 1980s. It is not clear to me whether the

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evidence indicates high returns to education during the 'green revolution' period or the period after that.

Returns to education seem higher in non-farm activities in the 'post-green revolution' period. There is no question that education is an engine of economic growth. An important question is whether returns to education are high because of the enhanced farmers' ability in farming or non-farming activities during the 'post-green revolution' period. According to the results of a seven-country comparative study organized by the International Rice Research Institute (David and Otsuka, 1994), schooling tends to be an important determinant of non-farm income but not of income from rice production. In this study, income data were collected in the late 1980s in a consistent manner across countries. Household income was decomposed into residual profit from rice farming (gross revenue minus actual and imputed costs of non-land inputs), non-farm income and other income categories, and then each component income was regressed on schooling of household head, production environment and the adoption of modern varieties, among other things. The residual profit was supposed to capture returns to land and management ability, whereas non-farm income measures primarily captured returns to labour in non-farm jobs. Schooling was significant only in 30 per cent of cases in the residual profit function but in 50 per cent in the case of the non-farm incomes function. These results indicate that education is no longer critically important for rice farming in the 'post-green revolution' period when technology is stagnant. To conclude, my impression is that the available evidence seems inadequate to draw firm conclusions as to returns to education in the 'post-green revolution' era.

*Joachim von Braun (Germany)*⁴

By making an effort 'to sort out the relationships' of health and labour productivity, Strauss and Thomas address a fundamental research problem in development economics, which obviously also has considerable relevance for agricultural economics. Raising productivity of all factors of production is the key to economic development although, because of the generally constrained access to capital in rural areas and the increased shortage of land in low income countries, raising productivity of labour is central in this context.

The productivity of labour may be constrained by impaired physical capabilities due to undernutrition, malnutrition and poor health, or to lack of education, skills and other human resource attributes. Deficiencies in the latter set of factors may be connected to the former. Both sets may also relate to technology and to the availability and access to health services, as a result of institutional conditions, market functioning and infrastructure in a broadly defined sense. A long-term historical perspective can assist in the sorting out of the health/nutrition and labour productivity linkages. Fogel's (1991) work on European countries in the eighteenth and nineteenth centuries points to the scope of such analysis.

Actual annual labour input in agriculture varies considerably across agroecological zones and farming systems, and – among other things – is

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related to gender. The role of health as a determining factor for labour input differentials remains unclear. In sub-Saharan Africa, for instance, male adults worked an average of 1000 hours per year in agricultural production, as compared with 2500 to 3000 hours in Egypt, and many Asian countries. Might poorer health in Africa be one cause of this difference? Eicher and Baker (1992) emphasize three important factors which account for the relatively low annual hours worked in farming in Africa during the year: seasonality of labour demand, non-farm competition for farm labour and failure to account for invisible labour inputs. Eicher and Baker also stress that 'substantially less research has been conducted on factors determining the supply and productivity of labour (health, nutrition, education, family size) than on the demand for labour'. To what extent poor health is a cause of low levels and low quality of labour input, whether in agriculture or in other sectors of low-income economies, remains to be explored.

Strauss and Thomas argue that 'human capital is much broader than education, training and test scores but encompasses a wide array of skills and attributes'. They focus on behavioural choices that affect health and labour productivity and, in particular, the relationship between the two. The authors first address themselves to measurement issues of health and related problems. Measurement, of course, relates closely to the definition of health, whether it is defined objectively (by qualified personnel) or subjectively (by the households concerned).

The careful discussion and literature review in the paper centres around simultaneity, unobservables and measurement error issues of labour productivity–health linkages and their implications for constructing econometrically estimated models. Empirical evidence of health and labour productivity relationships explored in the paper builds on a data set from Brazil, collected between August 1974 and August 1975. This survey was national in scope, with a sample size of 53 000 households. Somewhat unfortunately for this agriculturally biased forum, the authors select for their empirical explorations a sub-sample of men in urban wage employment (sample size 11 555). Rural and agricultural (self-employed) health productivity linkages are not elaborated in the paper.

Instrumental variable-based estimates by the authors underline the importance of height and body mass, as well as a set of food consumption and education variables for wage outcomes. The authors make an effort to deal with the simultaneity problem of health and productivity, yet, given the cross-sectional nature of the data set on the one hand, and the long-term (even intergenerational) relationships between health and labour productivity outcomes on the other, that effort must remain limited. Nevertheless, the important conclusions of the paper, that 'health and income clearly affect each other and both are related to many factors that are hard to measure', should be emphasized. Also the authors point out that virtually nothing is known about the dynamics which underlie the health–labour productivity relationships, an issue raised before in a farm productivity context, but so far only addressed in limited case studies (Kumar, 1987).

In order to fulfil the role of discussant by supplying critique and stimulating further debate, the following issues are raised:

- (1) Health services are very much a matter of state and public action. Health–labour productivity linkages are therefore to a considerable extent mediated through institutions and related organizational arrangements. But institutions do not enter the picture, or are implicitly treated as exogenous by Strauss and Thomas. Micro-based econometrics reveal their limitations for addressing the health–labour productivity issues in a broader policy context, given the institutional realities in the health sector. Leaving services exogenous may be problematic even within a cross-sectional analysis for a large country, like Brazil, with considerable interregional differences in health services (are not richer areas with higher wages better equipped with services?). Suitably broadening the framework would require modelling the interaction between the labour market and the health market (the latter being partly the outcome of political economy processes).
- (2) Technological change in agriculture increases labour productivity and reduces prices. Powerful impacts on health may result from technological change in the long run, given the feedbacks from health to productivity found in the paper. That also opens up the issue of the role of prices for health and productivity outcomes, which are touched upon in the paper in a somewhat puzzling way. Why, for example, should a higher aggregate price level and a higher price of beans increase protein intake, as suggested in Table 1? Is it because richer regions have higher protein demand and higher prices?
- (3) More attention needs to be paid by our profession to relevant studies undertaken by the medical and health research community on food, nutrition and health interventions and their outcomes for human productivity. Studies by Martorell (1993) on early childhood and pre-natal nutrition supplements and long-term outcomes for work capacity and intellectual performance (in a sample of Guatemalan children tracked over almost two decades) point at interesting long-term relationships. Work capacity, for instance, was significantly improved in children receiving supplements in their first three years of life; similarly, intellectual performance in adolescence was much improved. Also the importance of vitamin and mineral supply for intellectual performance (IQs) even in societies of generally well-nourished citizens (USA, UK) points at the complexity of the health–labour productivity relationship. The complex issues of the way households adapt to dietary energy stress, and what such adaptation means for labour productivity, are far from being resolved (Payne and Lipton, 1994).

Agricultural growth will in the future mainly depend on technological changes which will be more and more demanding of skills and other human resources. Morbidity, especially of women farmers, currently imposes a major constraint on agricultural growth and commercialization in low-income countries. In typical low-income rural settings in Africa, women farmers, for 15 to 25 per cent of their time, are ‘ill’ to a degree which impairs their work capability (von Braun and Kennedy, 1994). The prevalence of ill-health hardly correlates with income in these environments, but interregional differences in services do make a difference.

Overcoming the challenging health constraint upon economic growth, and effectively addressing the health threats of a more crowded world through appropriate public action, are an investment in growth and human welfare improvement (Ruttan, 1994). The evidence is certainly strong that investment in health pays off (World Bank, 1993). Furthermore, health is a necessity for social development in the widest sense, regardless of the precise levels of rates of return. Thus the question is not really if, but how, health improvements for human welfare, in rural areas in particular, can be enhanced. While public action in the health sector has to play the key role, it is also important to keep in perspective the favourable feedbacks from improved labour productivity on (effective demand for) health. Agricultural growth fostered by technical change, thus reducing food prices and thereby increasing real wages, may be particularly 'healthy'.

Lydia Kimenye (Kenya)⁵

The paper by Ackello-Ogutu and Mwangi provides a useful description of the historical and current situation regarding training of agricultural economists, particularly at the master's degree level. It also highlights the major constraints and weaknesses confronting the training programmes but does not offer substantive analysis of strategies for improvement. My further comments focus on important issues missing from, or not adequately covered in, the paper:

- (1) Supply has to be matched with the demand, yet the paper says very little of the demand for agricultural economists, for example, by both public- and private-sector institutions which potentially utilize the graduates (including the universities themselves that claim to be understaffed).
- (2) Table 1 shows total student enrolments. Clarification is needed to indicate whether the data include only postgraduates. Also a breakdown by gender, and by those enrolled in agricultural economics programmes or those which are predominantly agriculture-related at both undergraduate and postgraduate level, would have given a more complete picture of the situation and trend.
- (3) The issue of access to university education needs further elaboration, especially for the reasons explaining limited access, where little is mentioned beyond a lack of capital for prospective students in Uganda. Also the concern over limited access would carry more weight if supported by data indicating, for example, the numbers of students who qualify for a place and the proportion of those finally enrolled. A breakdown by gender and fields of study or programme would also be valuable.
- (4) The MSc course outline given in Table 3 is slightly misleading and needs clarification. The courses listed as options – Advanced Development Economics, Advanced Agricultural Marketing and Advanced Farm Management – are not, in practice, options. In the current programmes (1993/4) the students have taken both the first two. When I took the course in

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1980/81, only the Advanced Agricultural Marketing option was not available.

- (5) Regarding public financing, the World Bank report on structural adjustment in Kenya issued in February 1994 points out that there is still a heavy bias in public education financing towards tertiary institutions, particularly the public universities. Yet these institutions complain of underfunding. Could this be due to the rapid growth in the number of universities, constituent colleges and departments? If so, how can this proliferation be curbed?
- (6) The data for the university of Nairobi show that, between 1983 and 1993, there 73 students enrolled for the MSc programme, but only 38 graduates. Why is this? Similarly, only ten out of the 52 enrolled in 1991/2 at Makerere have graduated. Again a breakdown by gender of those who graduated would be more enriching. Similarly, a breakdown by elective field (agribusiness or resource-related fields) is missing.
- (6) None of the MSc course outlines in the respective universities offers a course on 'women in development', despite the increasing recognition that training people in this important field would be one step towards efforts at correcting the gender imbalance in policies on agriculture, trade and development in the world.
- (8) Though in the conclusion the authors suggest that it is probably cheaper to train agricultural economists locally, rather than training them abroad, they do not provide comparative cost estimates for popular alternative foreign training sites such as India to support their assertion.
- (9) The paper ignores the role played by private universities, especially in Kenya, where the number of such institutions has grown rapidly in the past five years. It would be useful to know whether these institutions train agricultural economists.

*Ibrahim Elbadawi (Kenya)*⁶

The paper on the human capital dimension in West Africa by Josué Dioné is based on the main premise that investing in people to build an indigenous scientific and managerial capacity lies at the core of sustainable development strategy. Based on this premise, the main thesis is that what he dubbed the 'gap filling' or 'missing ingredient' strategy of development has not only failed to produce positive results but has also crowded out indigenous highly skilled Africans. The author then argues for a strategy of external assistance aimed at directly enhancing indigenous human capital, with expatriate input and influence in the conceptualization and implementation of agricultural development strategies in sub-Saharan Africa (and especially in the Sahel) being kept to a minimum. In my view, the author has provided very convincing evidence, as well as a persuasive analytical framework, to support the main thesis of his paper as well as the broad strategic conclusions that flow from the analysis.

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Nevertheless, I do have some suggestions. The first is that more thought should be given to the 'endogenous growth' literature in order to provide further compelling evidence about the role of human capital in economic growth. The main theoretical idea, for which there is some empirical evidence, is that Africa cannot 'catch up' with the more advanced countries even though its initial levels of GNP are rather low, mainly because the stock of human capital is extremely weak relative to other developing regions. This is not only a matter of the highest level of skills; it also shows through in farming, where there is considerable evidence that yields of rice in 'green revolution' areas of Asia are very strongly influenced by the education of farmers.

Part of the problem, which is not addressed, is the role of the African 'state'. Not only do we rely too much on external assistance, but our governments pay too little attention to the funding of expenditure on education and health care. We compare badly with countries such as Thailand and Chile, which are but two of the more recent examples of rapid growth. It is a question of what can be called the 'mentality' of our governments, many of which have many 'parastatal' organizations and do not rely on the inherent abilities of educated people to seek opportunities for progress. It is a matter not only of formal education in schools and universities, but of enabling more mature people who have a developed educational record to receive relevant higher-level training. This is the function of the organization for which I work, which seeks to raise levels of skills in economics subjects. Similar networks are required in a range of activities where capacity can be developed.

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