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Introduction and Overview

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In the first three decades of the post World War II development era, national governments and aid agencies placed high priority on higher education capacity building. Based on the assumption that higher education would produce social benefits as well as individual returns, these investments were guided by two principles. The first principle was that insuring access to the frontiers of knowledge had high development "leverage." By sending young faculty to the leading universities in developed countries for advanced degrees, a developing country could quickly build one or more "flagship" universities where these faculties could work at the frontiers of their disciplines and offer leading-edge training for their countries. The second principle was that these universities would integrate the arts and sciences with the applied science and engineering disciplines to serve as a research conduit to the technological frontiers of developed countries. They would also train a domestic work force to build local prosperity and compete in world markets. These "first-wave" programs were supported by U.S. Agency for International Development (USAID) and FAO as well as private foundations such as Rockefeller and Ford Foundations.

Evaluations of these first-wave programs of support for higher education generally concluded that they did in fact achieve their objectives in most Latin America and Asian countries. Several programs were also developed in Africa, but these started later and had less success. Despite their overall success, support for these higher education programs dried up in the 1980s and 1990s. As they were discontinued, African higher education was particularly disadvantaged.

Several factors appear to be responsible for this decline in support. Supporters had conceived them as "one shot" programs and did not plan for continued support. Most first-wave support programs did experience brain drain losses (donor-supported candidates did not return to the home university or research center), but these were often considered manageable. Finally, many host governments, especially those in Africa, failed to provide the financial resources and institutional support required for flagship universities to succeed. It appeared not to be based on the brain drain problem.

Two additional factors contributed to the downgrading of higher education in the portfolios of development agencies. First, reviews of "returns to schooling" studies in developing countries appeared to be showing highest returns, especially for girls, to primary and secondary education programs, not to university education. These higher returns were in the forms of higher wages on income or improved social conditions. Returns to schooling studies are typically based on private returns and do not include an analysis of external benefits in the form of better access to technology or societal resources. Second, many development agencies shifted their support to projects promising short-term pay-offs. Often these projects were administered by nongovernment organizations (NGOs), and generally their success did not depend on high-level skills, such as Ph.D.'s or technical degree. This approach reinforced the shift away from higher education as a development priority.

Recent interest in a potential "second wave" of support for higher education programs is based on the prospects of improved institutional and host government support in countries where first-wave successes were not achieved. Thus, Africa is now considered promising for a second-wave support program.

This renewed interest in higher education led to support by the Rockefeller and Ford Foundations and by the Carnegie Corporation for convening a conference on International Higher Education and African Development at Yale University in October 2001. This conference was organized to:

- Review and refine elements of a policy-oriented research agenda and contributions from different professions and disciplines.
- Assess the costs of and benefits from strengthened higher education programs in Africa.
- Critique the underlying approaches.
- Explore the feasibility of enhancing the development impact in Africa of higher education in a globalized world.

The conference brought together a group of interdisciplinary experts involved in issues of higher education in Africa, development in Africa, and, for comparative purposes, higher education in Latin America and the United States.

The conference began with two keynote papers: Mamphela Ramphele on the university's role as an actor in national development and Kenneth Prewitt on the effects of changing global dynamics on higher education with special attention to Africa.

Four papers focused on the economic dimension. Benno Ndulu's paper provides detailed analysis of human capital mobility or brain drain issues with

innovative insights. Papers by T. Paul Schultz and by David E. Bloom and Jaypee Sevilla present a debate on private and public returns to investment in higher versus other levels of education. Robert E. Evenson's paper caps the economists' contribution with a focus on the contribution of high-level research, especially in agriculture and health sectors, to national development.

The final two papers focus on the institutional dimension. Ebrima Sall reviews the historic and contemporary challenges to and responses from Africa's higher education systems. Akilagpa Sawyerr concludes the series with a provocative analysis of the causes of the research and training gaps in Africa, accompanied by concrete responses to enable higher education to meet the development challenges of Africa.

In this overview, we summarize these topics and suggest further research and action options. Where possible, we have included the additional ideas generated during the conference and also in the formal comments.[1]

The University: Changing Roles in a Changing World

The conference began with a speech by Mamphela Ramphele, in which she stated: "There is no longer a debate about the importance of knowledge as a critical element of sustainable development in today's competitive global economy." Later in the conference, Ebrima Sall explicitly made the link that had been implicit in many of the discussions: "The growing importance of knowledge makes higher education more important than ever." This premise was at the heart of many of the discussions at the conference. Robert E. Evenson begins his paper with the claim, "Knowledge . . . is an international public good" and discusses why higher education is needed for individual countries to be able to tap into the global flows of this crucial public good. Clearly, there is a consensus that knowledge is important to national and human development. There is also consensus that higher education enables nations to both create and use this knowledge for development.

What is less clear is *how* higher education serves these purposes. What types, levels, and functions of higher education are suited to meet the spectrum of national development needs? Much of the discussion at the conference focused on teasing out the nuances in, if not actually on, this question.

A key question is what we mean by higher education. Higher education may include everything from postsecondary school vocational Ph.D. level training. Generally, we use higher education to refer to university education. Even the universities encompass a broad range of education. There is education at baccalaureate and higher levels, such as those for an M.A. or Ph.D. There are programs that prepare students for specific professions, such as business, law, or medicine, and those that prepare students for broader research or

policy-oriented fields. Different programs will have different impacts on students. They also have different spill-over effects within society.

Without explicitly stating so, many of these papers refer to flagship public universities. In discussions, there is a tension between what African universities could contribute and what they actually are able to do. The ideal form of these flagship public universities would provide quality undergraduate, graduate, and professional education for students and be involved in both theoretical and applied research. When discussing the benefits of universities and higher education, the participants are usually talking about the potential benefits from such a university. Unfortunately, even some of the premier universities in Africa are unable to perform these tasks, due to lack of funding, faculty, and infrastructure.

Kenneth Prewitt and Ebrima Sall both discussed the evolution of the "development university" as a successor to the colonial era flagship university. The development university is a university self-consciously linked to the development goals of the country. The development university was conceived to be more closely associated with community service and less tied to the discipline boundaries of traditional academic programs. It was to contribute to both long-term economic benefits in the form of trained manpower and short-term policy benefits.

The development university model has largely failed in developing countries. Prewitt attributes much of this failure to the collapse of donor support although he also considers the possibilities of design flaws in the model itself. Sall added political and ideological factors to the list of causes. Most followers of development aid programs generally and of those focused on higher education specifically, agree that these programs have become less coherent in recent decades. Virtually all development programs have increased their emphasis on short-term program objectives over long-term objectives and market versus public approaches. Today, higher education programs have lost their privileged place in donor priorities and strategies. There are fewer common views as to how a second wave of support for higher education programs should be shaped.

Human Capital Mobility and Brain Drain Issues

One of the most emotionally charged issues at the conference was that of brain drain. Prewitt reviews the global demographic and income forces that influence such movement. Ramphele and Sall, in different ways, both argue for the importance of a critical mass of scholars "at home" as a threshold requirement for university success in Africa. Although there continues to be a tension between Africans who are committed to remaining in Africa, regard-

less of the professional costs, and those who have left, some areas of consensus evolved. David Collis provided his own case as a contrary view. Though British and working in the United States, Collis is never accused of contributing to a brain drain from Great Britain to the United States.

Benno Ndulu makes a compelling case in his paper, documenting through a variety of sources the large numbers of skilled Africans who emigrate and establishing why this is detrimental to Africa's development potential. The level of losses of skilled people from Africa is quite high relative to other parts of the world. Kenneth Prewitt notes further that demographic changes in virtually all OECD countries mean that their demand for African talent will grow. In the OECD economies, the rate of entrance into the labor force will decline over the next few decades; and traditionally, they compensate by allowing more immigration.

The literature on the brain drain has several strands. The early literature of the 1960s and 1970s developed the notion that developing countries have a comparative advantage in exporting skilled workers. This argument is simple: Skill creation is a time-intensive activity on the part of both the trainers and the trainees. Thus, low-wage economies have a comparative advantage in producing skills, provided they have the same skill production technology as high-wage countries. The export of these skills requires migration. Those who migrate benefit, and they also send remittance payments home to their families and, possibly, to the institutions that trained them. The skilled migrants may be fully trained or, if partially trained, they migrate to obtain further training.

For this model to actually work, the following conditions must be met: (a) The trainers need to be more talented and skilled than the trainees, (b) the incentives must be in place to limit the migration of the trainers, and (c) the trainers and their organizations must have high levels of skill production technology.

The model does apply to some professions, especially the medical professions. For example, nurses trained in the Philippines migrate to OECD countries. They obtain higher incomes and send funds to their families in the Philippines. Incentives systems are adequate to bring talented trainees into the nurse training industry and to keep them there. The skill production technology has high standards. Most nurses trained in the Philippines have skills appropriate for model hospital facilities in the United States and Canada. In the social sciences and other fields, we do not see this model working. Although U.S. universities offer Philippine students places in Ph.D. programs, they do not offer many assistant professor positions to them.

One reason that the brain drain phenomenon is costly is that there is not an abundance of potential Ph.D. students in any society. Although there may be a

large pool of talented individuals, the best pre-Ph.D. students are more than talented. To succeed in getting into Ph.D. programs, they have been competitive in disciplinary courses. They have exhibited discipline, drive, and energy. They are committed to understanding and mastering the field. They have creative potential. The pool of candidates who have all of the characteristics necessary for success as Ph.D. students and researchers is quite small. Thus, the loss of these people may have a significant and magnified impact on African development. Ramphele, Sall, and Sawyerr all underscore this point.

Moral or loyalty arguments have been used to encourage people from developing countries to return home. Promoting teaching and research environments in African countries that are conducive to effective careers may be one way to lessen the number of skilled workers leaving Africa. Several conference participants noted the necessity of having a critical mass of scholars and researchers in a community for it to be effective. Ramphele refers to the importance of agglomeration economics, and Sall stresses the need for renewal of intellectual capital.

Research and scholarship now requires that people be part of a global community. Researchers, whether working in New Haven or Accra, must be part of networks of other scholars working on similar issues. Thus, it may be useful to also think about brain circulation, as well as, or instead of, brain drain. Claudio de Mauro Castro noted that Brazil has the problem, not of brain drain, but of a lack of brain circulation. Due to Brazil's size and its reliance on Portuguese, many Brazilian scholars do not circulate enough among other scholars, refreshing and refining their thinking. Rather they become isolated within Brazil with stultifying results.

There is little direct evidence on the benefit to Africa of having skilled people emigrate. Clearly there are losses, but there are also some gains in terms of remittances and in terms of contact with ideas and people in other countries. Preservation of intellectual capital may be an unintended result of brain drain. To understand the reasons behind the brain drain phenomenon in Africa, David Rubadiri, in his response to Ndulu's paper, reminded us that conflict and civil strife in Africa have been among the most important causes of skilled emigration.

One issue that should be further considered is that African countries subsidize education at all levels. To the extent that the social benefits of the education are transferred to the country where the person migrates, Africa is transferring resources to the OECD countries. It is agreed that Africa cannot simply place restrictions on allowing people to emigrate, but it is also important for African countries to find ways to recoup some of their investment in these individuals. A number of schemes were suggested, including insisting that

emigrants repay a portion of the cost of their education. Yet even if they repay the cost of their university education, the cost of all of the previous years of education will have been subsidized by the African governments. In addition, only a few students have the potential to gain Ph.D. degrees abroad, but it is not possible to know which ones have this potential at the time they begin primary school. Thus, many children must be educated in order to have a few who are able to do doctoral work.

Valuing Higher Education: Measuring Benefits and Costs:

A key question for policy regarding higher education is the extent to which the net benefits of higher education are received by the individuals obtaining the education and the extent to which they spill over into society in general. The presence of externalities to higher education is one key argument for the public subsidy of higher education. A second argument is that the institutions of higher education provide a public good in their own right. In this section, we examine first the costs and benefits of higher education to individuals and then the value of universities.

There was relatively little discussion of the costs of higher education at the conference, although there was discussion about who should bear the costs. Private costs of education are the costs that individuals incur when they attend the university. They include any school fees, costs of materials including books, and living costs. There are also opportunity costs of attending the university; time spent in class and studying is time that is not spent doing something else, such as working in a family business or in agricultural production.

The public bears much of the cost of higher education in Africa. As many of the papers discuss, higher education in Africa is highly subsidized. Students frequently pay no tuition or fees; and in many countries, students are also given a stipend to cover their living expenses. Thus, many of the costs are publicly covered. There is political pressure in most African countries to maintain at least some of the subsidies, although many universities are beginning to think about ways to have students contribute to the financial costs of their education. The costs are typically not well documented, but there is relatively little controversy about what the costs include.

Much more discussion focused on the benefits of higher education and to whom they accrue. Paul Schultz's paper uses the limited data available in household survey data sets to estimate the private benefits of higher education in Africa by examining the effects on wages. He finds substantial private benefits to higher education in Ghana, Kenya, Côte d'Ivoire, and South Africa. He is unable to distinguish among various forms of higher education in his analysis due to limitations of the data.

The research on returns to higher education, as reported by Schultz, typically looks at the relationship between individual income and additional years of education. Such studies for higher education versus primary and secondary education usually show higher education unfavorably in terms of return on investment. Schultz's findings suggest a more favorable comparison, admittedly based on limited data. He encourages more careful empirical analysis to guide educational investment policy. Due to data limitations, few studies distinguish between university and vocational programs. Nor do they distinguish between students obtaining professional degrees, such as law, medicine, or business, and those obtaining more academic degrees in the sciences, social sciences, and humanities. The data are limited in part due to the relatively small numbers of people with any form of tertiary education in nationally representative household surveys.

Even though the returns may be high, Evenson argues that private returns to skill acquisition in many developing countries, including African countries, are not sufficient to justify sending students abroad to study in developed country programs. Thus, although there are private returns to higher education-–even for those living in Africa upon the completion of their degree-–the returns are not high enough to cover the costs of sending students abroad for their education because of the large and growing income differentials between African and developed economies. To justify these expenses, it is necessary to also consider the public benefits.

Simply looking at the effects of additional education on wages may not capture other private benefits. Education may confer status. Students may also enjoy their studies and the work that they are able to do upon completion of their studies. In addition, the literature on gender and education at the primary and secondary levels discusses the empowerment effects of education—people, especially women, with more education are more able to take advantage of opportunities that are available to them and to create new opportunities. They are better able to succeed within the formal sector, including businesses, extension offices, credit institutions, and health care professions. Little work has been done on the empowerment effects of higher education.

The most difficult aspect of the costs and benefits to measure is the social benefit of higher education. In fact, in his discussion of these issues, Schultz challenges those who claim that these benefits are high to find ways to measure them. Evenson claims that the public returns are significantly higher than the private returns for inventors and innovators. Thus, there is an argument that the education of potential innovators should be subsidized. Prewitt also stressed ways that institutions of higher learning have a beneficial aspect. They include generating economic growth through increasing productivity and tech-

nological capacity enhancement, creating space for public dialogue, and creating an intellectual infrastructure of people who can be involved in solving development problems.

These are benefits that may accrue from having successful universities within a country but do not necessarily accrue by simply having a well-educated population. These benefits, along with reasons of status and prestige, are reasons that individual countries want to have their own flagship public university and not simply depend on other African or other developed countries to provide this service.

There clearly are social benefits to higher education. Two areas of innovation that were discussed in the papers were the areas of agriculture and health. Both areas require well-educated people within the country taking advantage of knowledge available elsewhere and applying it within the particular context and constraints of the country. Sawyerr, Evenson, and Sall argue this topic from different angles. Evenson focuses on why it is important for individual countries to have people with Ph.D.-level training capable of the innovation and invention crucial to their country's development. Using the example of the agricultural sector, he demonstrates why it is not possible to simply borrow innovations from developed countries. Instead, it is necessary for African countries to have their own scientists, working in their own countries, to adapt and innovate to meet local conditions.

Yet it is important to find ways to measure these social benefits so that the benefits from expenditure on higher education can be weighted against the social benefits from other public expenditures. Schultz stressed that social returns to higher education may be lower than those to health or primary school expenditures. Yaw Nyarko noted that we do not know whether spending on higher education has a larger impact on development than expenditure on roads. Documenting both the potential and the actual social benefits will be a challenge, but a task it is important to do.

Related to the issue of who benefits from higher education is the question of who should pay for higher education for Africa. If all of the benefits were private, then it would be appropriate to allow the market to allocate higher education in countries where educational markets function. Given that at least some of the benefits are public benefits, the government will have a role to play in the provision of higher education. This role is even larger in the absence of efficient private markets.

If the private benefits to higher education are high, as Schultz suggests, then there are reasons to create a system where students pay some of the cost of higher education. In addition, in a world where universities are severely

underfunded, it would be appropriate for universities to charge at least some students for their education. The challenge becomes to create such a system that does not disadvantage students from low-income households.

Bloom and Sevilla note the relative lack of externalities to be gained or to be captured by public subsidies. "The most likely reason for this to occur [i.e., for the demand for education to be unresponsive to costs] would be for people to so strongly value the benefits of higher education that reasonable variations in its costs do not dissuade them from investing in it. Under these conditions, subsidies are ineffective as an inducement to investing in college, since people would have made the investment in the absence of the subsidy anyway." Yet Chacha Nyaigotti ChaCha and other conference participants disagree. ChaCha claims that education can still serve as an equalizer in Africa and notes that many at the conference were from humble beginnings and have arrived here due to the public subsidization of higher education.

Several propositions for ways to allocate funding to less advantaged students were proposed. Schultz recommended targeting subsidies to students from rural areas or students whose parents had very limited education. Either of these approaches would be a good proxy for targeting low-income households without trying to obtain accurate household income data. ChaCha suggested that student loan schemes can and do work, based on his work with the loan board in Tanzania and Kenya.

Institutional Foundations and Research Initiatives in African Higher Education

New private universities are also challenging the traditional public university. Although there have been few private universities historically in Africa, they are beginning to emerge on the landscape. Private universities have the potential to make higher education more widely available and, by providing competition to the public universities, to improve the quality of higher education overall. Yaw Nyarko, in his response to Sall's paper, argues that a new private nonprofit university being developed in Ghana will serve this function and is meeting rigorous academic and professional standards. Others worry that the introduction of private universities may lower these standards. In addition, it is feared that the private universities will provide services only to students who can afford to pay for them, either because they are from wealthier families or because they can obtain resources based on the expectation of relatively high returns on their education investment. The public universities may be left with poorer students and those who are in fields that will have lower returns. This will limit the ability of the public universities to charge tuition and other fees.

Distance education programs, especially those from developed countries, may also pose a challenge to public universities in Africa. At the moment, however, access to the Internet is still relatively limited in Africa; thus, it may be some time before Internet courses provide a serious challenge to universities.

Many participants at the conference spoke to the need for a diverse set of institutions to provide higher education in Africa while enhancing the quality of all of the programs. After carefully reviewing the history of universities in Africa, Sall suggests that Africa needs a plural and well-managed higher education system centered on public universities. The large flagship public universities are likely to continue to be at the core of higher education in Africa, even as new forms of education develop.

Many of the authors suggest that it is important for Africa to figure out how to appropriately use these new actors within the higher education system. Ramphele suggests, "Most sub-Saharan African countries also have [only] a small nonuniversity sector, with the exception of Nigeria, Kenya, and South Africa. This is a major concern not only because nonuniversity institutions can absorb a significant share of the demand for higher education, but also because they are in general more capable of responding to rapidly changing labor market needs and are better positioned to offer lifelong education."

Research Needs and Action Options

As the conference participants engaged in debate across disciplinary boundaries, a number of issues were raised that warrant additional research. In many cases, the data are not available to answer these questions, so any research project would need to include data collection. Two main categories of research questions emerged.

First, better information is needed on the costs of higher education and who bears the costs. Although data may be available on government budgets for higher education, this is only a fraction of the total costs. We need to know the full costs, including the opportunity costs to students of being in school. In addition, we need to know who is bearing the cost. What fraction does the government pay? Of the portion paid by students, who actually pays it? To what extent are donors or the private sector bearing any of the costs of higher education? Although it should be relatively easy to locate expenditure data, Teboho Moja noted that she was unable to find any data on expenditures on research by the government or the private sector.

The second set of questions relates to the emigration of skilled professionals. Although Ndulu did an excellent job in his paper of pulling together the available data on the outflow of skilled emigrants, his paper demonstrated that

there are significant gaps in our knowledge of who is leaving Africa. In particular, our information is far from complete on the skill sets of those who leave and how they obtained their education. The other aspect of the brain drain that needs additional research is the possible benefits to Africa of having skilled emigrants. There was some consensus at the conference that some level of emigration may benefit Africa but that too much skilled emigration is detrimental. We found no agreement on what the optimal level of emigration would be. Quantifying the benefits and costs of skilled emigration would be useful in determining the optimal level. It would, of necessity, also contemplate the corollary issue of a critical mass and the threshold numbers of faculty in what fields for viable intellectual capital in Africa.

It is important to have national flagship universities in Africa, although not necessarily in every African country. Flagship universities require national faculty trained at the frontiers of their discipline and with sufficient support and colleagues to work at that same frontier.

Simply admitting African students to U.S. universities will not be sufficient to increase the skill levels in Africa. The public benefits of having a university in terms of its role in the creation of civil society would not be achieved by simply sending students to universities in developed countries.

To have faculty trained at the frontiers of their discipline, it will continue to be important for some time to send Africans abroad for Ph.D. degrees. One set of challenges revolves around how to successfully send Africans abroad to get the necessary training. Many African students with the potential to succeed are not well prepared for Ph.D. programs at U.S. universities. Thus, predoctoral programs may be useful and necessary.

New solutions may be through joint degree arrangements through African and U.S. universities. These might provide coursework and exams at U.S. universities with the student conducting much of the dissertation research based at the African university, with both universities approving the final dissertation. This has the advantage of encouraging faculty at both universities to work together to insure a strong program of study. It insures a high quality of education while insuring that the public benefits of dissertation research are realized in Africa.

Traditional "sandwich" degree programs have been in place informally (and, in some cases, formally) for a number of years. They have not attained success, partly because U.S. and European universities have not seen these programs as enhancing their reputations or providing other serious benefits. But they could be more effective if supported by joint university research programs.

As new universities and other forms of higher education emerge in Africa, as they are doing globally, it will be important to find ways to insure the standards of these institutions. Ramphele proposed using international credentialing mechanisms. Requiring that African students pass standardized exams may be one way to provide some quality control. Sall cautions that, when setting such standards, we must also work to find ways to improve support so that African universities can meet standards.

Finally, it is important to find ways to keep faculty at African universities up to date with the frontiers of knowledge. Improved technology can be useful, as the Internet can provide a means for faculty to access information. The resources to be able to access this information via the Internet can be expensive. Networks, such as the African Economic Research Consortium, have worked well in Africa to bring faculty together and continue the peer pressure that encourages good research. As Sall points out, systematic evaluations of the disciplinary networks will help refine and strengthen their contributions. Postdoctoral programs, especially with a few flagship universities, are another way to insure that faculty at African universities spend time with colleagues working on the cutting edge of the disciplines.

The papers that follow provide lively insights and provocative questions on many of the ways that higher education works for African development and also some of the constraints on these important roles. The four key themes, identified by the editors, that emerged from the conference were: (a) the potential importance of African universities in contributing to development nationally, regionally, and globally, especially in the areas of agricultural and health research; (b) the need to rethink traditional notions of "brain drain" into a more comprehensive notion of "brain flow" where people, ideas, and resources circulate among institutions and sectors globally; (c) the crucial role of the multifunction flagship university in providing a critical mass of intellectual capacity to support research and teaching and also insure successive generations of academic leadership; and (d) the need to redirect approaches to valuing higher education to include much more than the private returns but also to include the public and social returns. Such value concepts have been more thoroughly refined for primary education in development worldwide and in Africa than for higher education.

Note

1 At the conference, each paper received formal commentary by two experts from different fields and/or world regions than the paper's author. Each set of papers and commentary is available through the YCIAS Working Papers Series at www.yale.edu/ycias/publications.htm.

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The University as an Actor in Development: New Perspectives and Demands[1]

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Abstract

This article addresses the obstacles hampering African universities from playing their needed role in national development, particularly challenges stemming from the unfinished agenda of national reforms and emergence of globalization. It examines pervading issues of higher education within the context of HIV/AIDS pandemic and massive brain drain—two major issues currently confronting Africa. Using OECD countries for comparison, it presents demographic, migration, health, and educational analysis for Africa. The paper underscores the presence of substantial differences between countries with respect to incomes, education systems, political institutions, and, in a more dynamic sense, economic performance over time. It also argues that we are undergoing an integration process (through globalization) which is critically based on knowledge. It warns that developing countries are falling behind industrialized ones in terms of low enrollments, low quality of education output, and low retention of qualified persons. The article recommends as more sensible policy options (a) developing standards for "borderless" international education and resource sharing, (b) mitigating brain drain, and (c) untying aid in favor of focusing on the development, retention, promotion, and use of local talent. It describes several model initiatives for each proposal.

Résumé

Cet article porte sur les obstacles qui empêchent les universités africaines de jouer leur rôle au sein du processus de développement national. Il s'intéresse particulièrement aux défis émanant du programme inachevé de réformes nationales

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et de l'émergence de la mondialisation. Il aborde les questions concernant l'enseignement supérieur, dans le contexte de la pandémie du VIH/SIDA et de la massive fuite des cerveaux (deux grands problèmes auxquels l'Afrique est confrontée). Tout en citant les pays de l'OCDE comme éléments de comparaison, il présente une analyse démographique, migratoire, sanitaire et une analyse relative à l'éducation sur le continent africain. Cette contribution souligne les différences énormes existant entre pays en ce qui concerne les revenus, les systèmes d'éducation, les institutions politiques et les performances économiques, à travers le temps. Elle affirme également que nous traversons un processus d'intégration (à travers la mondialisation) basé essentiellement sur le savoir. Elle soutient que les pays en développement sont en retard par rapport aux pays industrialisés au vu de leur faible niveau d'inscription, de la faible qualité de la production dans le domaine de l'éducation et leur incapacité à retenir les personnes qualifiées. Cet article recommande les options de politique suivantes : (a) le développement de normes pour une éducation internationale et un partage de ressources « sans frontières », (b) la maîtrise de la fuite des cerveaux et (c) le déploiement de l'aide en faveur de la promotion, du maintien et de l'utilisation des talents locaux. Plusieurs initiatives modèles sont décrites pour chaque proposition.

Introduction

I approach this subject more as a student of African development than as an expert. African development is very complex. If we consider regionalization as a predecessor to globalization, Africa is the least "regionalized economy" when compared to the European Union, ASEAN, NAFTA in North America, and Mercosur in South America. This is not difficult to explain. There are a significantly higher number of African ethnicities than there are nations. As an aid to making the comparison, consider that there are over 1,000 different languages spoken across Africa.[2] In my home country of South Africa alone, there are 11 languages, each representing strong historical, cultural, and familial ties.

There is no longer a debate about the importance of knowledge as a critical element of sustainable development in today's competitive global economy. Each nation is challenged to enhance its capability to create, access, and apply knowledge to address the numerous development challenges it faces. Greater attention is being focused on developing viable innovation systems to meet the development needs of each nation within the limits of its resources. The university has traditionally been at the heart of innovation in society. But the idea of a university-based innovation system is new and untested in many parts of the world. The university's effectiveness as an actor in development depends largely on its nimbleness in adapting to the rapidly changing global knowledge society that is set to dominate the 21st century.[3]

There seems to be a cruel irony in the inverse relationship between the size of the development challenges that nations face and the capacity of their university systems to rise to meet them. The African university system faces the greatest challenge in this regard. The colonial model of the university as an ivory tower is no longer sustainable. Nor has the idea of the postcolonial development university lived up to the promise it held for many. The university as an actor in development has to balance short-term societal needs to address specific problems on the one hand; on the other, it must balance the long-term agenda of teaching, research, and learning to enable society to regenerate itself in sociocultural terms and to take advantage of opportunities presented by the knowledge economy.

In this paper, I will address three major points. First, the university as an actor in development faces challenges on two fronts, those stemming from the unfinished agenda of development and national policy reforms, and those of globalization. Second, brain drain is bedeviling the capacity of the university to act, and to play its traditional and essential role in the service of larger national development needs. This problem is exacerbated by globalization forces. Although my focus will be on the worldwide setting of the university as an actor in development, I will highlight the specific case of Africa in elaborating in these first two points. Third, and finally, I will address the need to evolve more sensible policy options in three key arenas that both national governments and the international community must tackle to address these issues.

The Unfinished Agenda

To fulfill its potential as a positive actor in development, the university faces the challenge of the unfinished agenda of policy reforms in two domains. First are the national policy reforms needed to spark and sustain development interact in crucial ways to constrain or enable the university's full scope. Second, the policy reform for the overall education sector must also be underway, paying particular attention to the need for reform of the higher education institutions. In this section, I will discuss the overall higher sector trends in developing countries with reference to Organization of Economic Cooperation and Development (OECD) country trends as well as the national policy frameworks in which the university sector must function.

The HIV/AIDs epidemic also creates challenges for the university in many developing countries especially in sub-Saharan Africa where it threatens to reverse the development gains of previous decades. For example, South Africa has an estimated HIV infection rate of 10% of its 43 million people. This figure rises to 25% among those ages 15 to 35. The latter segment is the driver of viable education and economic performance. The full impact of this pandemic

is yet to be established, but life expectancy has already dropped from 70 to 50 years. Projections for the majority Black African population indicate a drop to 38 years by 2010. More generally, in Southern Africa, life expectancies will be falling to levels that have not been seen in over 100 years. In a region that would have expected life expectancies to reach 70 years of age by 2010, many will see life expectancies falling to around 30. Average life expectancy in sub-Saharan Africa is now 47 years, when it would have been 62 years without AIDS (Stanecki, 2002 UNAIDS 2002).

A review of the trends in enrollments worldwide reveals a serious development gap between north and south. Despite the rapid growth of higher education enrollments in most developing and transition countries over the past decades, the enrollment gap in relation to OECD economies has not decreased. In fact, quite the opposite has occurred.

In 1980, the higher education enrollment rate in the United States was 55% compared to an average of 5% for developing countries as a whole. In 1995, the numbers were 81% and 9% respectively. Enrollment rates have diminished slightly in Europe and Central Asia during the last decade, from 36% to 34% on average (UNESCO Statistical 1999; UNESCO 2000).

Regional averages hide significant differences in evolution patterns. Rapid growth has occurred in countries such as Poland, Hungary, Romania, and Bulgaria (now in the 20-30% range), while enrollment levels are stagnant or even decreasing in the Central Asian republics like Tajikistan (9%) and Uzbekistan (5%). Of the other regions of the world, Latin America and the Middle East have the highest averages (18% and 15% respectively in 1997) and South Asia and Africa the lowest (7% and 4% respectively). The East Asia average of 11% also conceals wide differences. In Cambodia less than 2% participate in higher education compared to the Philippines where the rate is almost 30%. Korea is now on a par with other OECD economies at 51%. The need to invest in expanding coverage at the higher education level is nowhere more visible than in the large countries of Asia like India, China, and Pakistan with enrollment rates of 6%, 5% and 3% respectively.

Higher education enrollments are partly dependent on outputs from lower levels of education. For example, while most regions and countries have seen increasing transition rates from secondary to higher education and, in turn, from primary education to secondary, in Africa the growth of secondary school enrollments has slowed down as a result of a decline in primary level enrollment and the dramatic demographic shocks of HIV/AIDS. Eastern Europe and Central Asia have been experiencing decreasing secondary enrollment rates mainly due to an antipathy towards vocational training courses.

The lack of institutional differentiation to accommodate the diverse expression of growing demand for higher education is partly to blame for low enrollments. In Latin America for instance, while countries like Cuba (79%), Peru (43%), Brazil (38%), and Chile (35%) have a significant nonuniversity higher education sector, others like Panama, Guatemala, Honduras, Nicaragua, and El Salvador have a very small nonuniversity sector (less than 5%). Most sub-Saharan African countries also have small nonuniversity sectors, with the exception of Nigeria, Kenya, and South Africa. This is a major concern, not only because nonuniversity institutions can absorb a significant share of the demand for higher education, but also because they are in general more capable of responding to rapidly changing labor market needs and are better positioned to offer lifelong education. Undifferentiated higher education systems overburden the university and throttle its ability to act as an appropriate development actor that gives leadership to an integrated education and training system.

An equally worrisome issue is the slow rate of expansion of graduate education in many parts of the world. In the Latin American and Caribbean region, for example, students enrolled in graduate programs represented on average only 2.4% of overall higher education enrollment in 1997, compared to 13% in the United States. Whereas in OECD countries, there is one new Ph.D. graduate per year per 5,000 inhabitants, in Brazil the corresponding number is one per 70,000. In Chile it is one per 140,000 and in Colombia one per 700,000.

The relative underdevelopment of graduate education in several countries is only in part the result of a tradition of sending graduate students abroad. In Thailand, for instance, graduate studies represent 3% of overall enrollment, compared to 8% in South Korea. In Bulgaria, the number of doctoral students has dropped from 5,000 to 3,400 in the past five years. The painful truth is that many developing countries do not have the capacity to expand graduate studies.

Poor management of public expenditures in many countries has undermined their financial capacity to undertake further expansion of the public higher education system while retaining satisfactory levels of quality. In the past 10 to 15 years, expenditures for higher education as a percentage of the total public education budget have experienced a significant reduction in several countries. In some cases (like in Afghanistan, Bangladesh, Brunei, China, Nepal, Oman, Guinea, and Saudi Arabia) this reduction has been nearly half of the respective education budget. In Africa, expenditures per student have declined in real terms in 10 of 15 countries for which data are available. HIV/AIDS have exacerbated the problem of dwindling resources and reduced funding. Universities have been forced to spend much more as a result of the epidemic, including direct costs for medical services, testing and treatment, terminal ben-

efits at an earlier stage; funeral expenses; replacement, recruitment, and training of new staff; higher rates of absenteeism, and a general loss of productivity. But African education faces more problems than the effects of the HIV/AIDS epidemic, severe though they are.

The problem of insufficient or, in some cases, even declining funding is often compounded by the inefficient use of available resources. These management inefficiencies drain scarce resources away from the fundamental objectives of increasing the access, quality, and relevance of education. Examples of such inefficiencies include underutilized facilities, duplicative program offerings, low student-staff ratios, high dropout and repetition rates, uneconomical procurement procedures, and a large share of the budget devoted to noneducational expenditures. Many university facilities are closed during the evenings and weekends in accordance with civil service regulations or agreements with professional associations. In Eastern Europe and Central Asia, the higher education sector continues to be fragmented. As a result, there are too many small institutions that other similar programs operate with high unit costs. At the same time, some countries restrict (or outright prohibit) the operation of private universities.

Low student-staff ratios and high repetition and dropout rates also drive up the cost per graduate. High repetition and dropout rates are among the most important sources of low internal efficiency in public universities, especially in countries with open access. In some countries, the average degree completion time for four-year undergraduate programs is seven years. This problem is sometimes compounded by the longer than usual time required for first degrees. Compared to the three years of undergraduate studies in England, and the four years that are typical elsewhere, in Bolivia, the length of the first degree is five years; but on average, students actually take nine years to graduate. In Guatemala, the public universities spend 22 student-years to produce a graduate from a six-year undergraduate program.

In many countries, a large share of the public higher education budget is devoted to noneducational expenditures in support of student scholarships and subsidized student services, such as housing, food, transport, medical services, loans, and other services. While representing only 6% of recurrent expenditures in Asia and 14% in OECD countries, student support represents around 15% in Eastern Europe and Central Asia, around 20% in North Africa, the Middle East and Latin America, and close to 50% in francophone sub-Saharan Africa. In Sri Lanka, all students receive a maintenance grant, regardless of socioeconomic circumstances. (World Bank 2002a).

Another source of inefficiency in some public institutions is the high proportion of overhead and salary expenditures for nonteaching staff. Nonteach-

ing staff are often more numerous than teachers in the universities. In my previous job at the university of Cape Town, I had to address support staff wages that were more than 40% above the market while professorial salaries were 40% below the market. Imagine how popular I was at the end of the reform process! A number of countries offer relatively generous salary benefits to their staff; such benefits make up the bulk of expenditures, leaving only limited resources for nonsalary expenditures for educational purposes (educational materials, library resources, laboratory products, maintenance, etc.).

In a somewhat contradictory way, the expansion and diversification of higher education systems without fundamental reforms in the public sector has often led to internal brain drain. Low-paid professors in public institutions seek second and third extramural jobs such as teaching at private institutions and colleges which might offer better salaries. This internal brain drain is compounded by the external brain drain.

Despite the incredible constraints posed by globalization and other forces, national governments retain the primary responsibility for ensuring resources for effective higher education systems. The university can contribute to development by internal efficiencies and also by providing leadership to national policy reform, especially in the education sector. Faced with the need for better education and economic policies at home, developing countries bear some responsibility for tackling the unfinished agenda of reforms and for facing human capital development without the undue postponement of often painful policy reforms. Now, with acute awareness of the exacerbating influence of globalization, I will turn to one of the single greatest challenges that the university must face if it is to be a true actor in development—the external brain drain.

Brain Drain and Globalization Forces

Language and its uses among different professions is a fascinating subject. As a medical doctor, I find the term "brain drain" disconcerting. How can one survive with one's brain drained of its content? On the other hand, working at the World Bank, I have come to admire the linguistic gymnastics of economists. I recently heard the expression "endogenous growth," as if growth at any other point came from Mars. When I noted at the beginning that I consider myself a student of Africa, I should have also added that I have unwittingly become a student of economics.

Greater labor mobility is an inextricable part of the process of globalization. The benefits of labor movements and greater integration have been known for a long time. More recently it has been amplified through the idea of endogenous growth theory. The idea is that workers with the same skills—be they

farmers, factory workers, or engineers—are less productive and earn less in developing economies than in advanced ones. Integration through trade in goods, foreign investment, international telecommunications, and migration reduces these gaps by raising productivity in the developing world. In this way globalization can be a powerful force for poverty reduction. But closer examination of the nature and direction of global migration is critical for a clearer understanding of these patterns in today's knowledge economy. What are the implications of migratory patterns that encourage the movement of skilled labor from developing countries but raise barriers to unskilled labor and primary commodities from the same countries? How sustainable will those countries be that are losing their best brains at rates outstripping their ability to regenerate them? Are remittances offering enough compensation?

There is nothing new in people voting with their feet—or boats or planes, for that matter. In fact, compared to 100 years ago, the world is much less globalized in terms of labor flows. Between 1870 and 1910, approximately 60 million people migrated from Europe, primarily from its less developed regions, to the United States and other parts of the New World. South-south labor flows were also extensive in the early periods of globalization. Though less well-documented, the flows from densely populated China and India to Sri Lanka, Burma, Thailand, the Philippines, and Vietnam were of the same order of magnitude as the movements from Europe to the Americas. That would make the total labor flows nearly 10% of the world's population in 1870. In contrast, the total legal immigration into the top 10 receiving countries in the past 25 years amounted to about 1 percent of the world's population (World Bank 2002b).

The world has become one world and is no longer the sum of nation states. Declining communication and transportation costs have further facilitated globetrotting. This dynamic has led to a global market for advanced human capital in which individuals with higher education are the most likely to participate.

In this 21st century marketplace, the richer countries manage to attract and retain the world's best-trained minds in many ways. Among the more powerful pull factors are effective policies that stimulate research and development (R&D) activities and increase direct investments; offer attractive graduate training and research opportunities; and recruit younger graduates and professionals. OECD countries are increasing their investments in research and development (R&D) not only in the science and technology (S&T) sector but also in other knowledge based sectors, thus creating job opportunities for well-trained people.

Three examples drawn from early 2001 illustrate this point. The Australian government announced a 100% increase in the funding of the Australian Re-

search Council and a tax write-off equivalent to 175% of the value of research and development spending of firms. France and Germany relaxed the issuance of visas to attract foreign professionals in technology-related areas. Similarly, the United States introduced an amendment to the immigration law that included 600,000 new visas for scientists and engineers (U.S. Public Law 2000). Roughly 25% of science and engineering students in U.S. graduate schools come from other countries.

Countries like Canada, Australia, and member countries of the European Union all compete for their share of well-trained people in the global market place. Overall, advanced countries are placing recruitment offices in countries where graduates are available because of lack of opportunity on the home front and political instability. All these graduate recruits received their basic education and first degrees abroad. The cost of their initial training was assumed by other countries, the sending countries. What does this translate into on the sending side of the equation? It is estimated, for example, that at least 40% of the graduates of the prestigious Indian Institutes of Technology seek employment abroad. In Venezuela, one of the most prestigious private universities, the Metropolitan University, lost 50% of its graduates in the 2000 academic year to multinational corporations abroad. In Bulgaria, the Union of Scientists estimates that 65% of all university graduates (close to 300,000 persons) have left the country during the past decade.

The economic foundation for migration is obvious. Hourly labor compensation is about 100 times higher in Germany than in China or India. That gap is particularly extreme; but even between the United States and middle-income countries such as Malaysia or the Philippines, the compensation gap is more than tenfold. That gap in part reflects the value of higher education or skills for the average worker in Germany or the United States, compared to developing countries. But skill gaps and the higher costs of living in industrialized countries explain only part of this differential.

There are typically substantial real gains to individual workers who migrate to more developed economies. And nowhere else in the world are these gains more pronounced than in Africa, for two reasons. First, Africa has the lowest average incomes and this constitutes a "pull" factor by the richer countries. And, second, the political environment often constitutes a powerful "push" factor out of Africa.

The Case of Africa

Economists increasingly argue that the geography of development is important in many ways. It is a phenomenon of agglomeration economies that firms tend to cluster together with significant vertical linkages among them. According to

some estimates, two thirds of manufacturing output consists of intermediate goods, sold by one firm to another. The presence of a rich network of manufacturing firms provides a positive externality to each firm in the system. Once this effect is allowed for, the location decisions of firms become interdependent. This factor can give rise to a divided world which makes it more difficult for an underdeveloped region to attract productive investments.

This hypothesis begs for further research from a human development perspective. How realistic is it to expect educated people to stay in Africa instead of coming to the West and joining 30,000 of their counterparts who hold Ph.D degrees? Issues of geography and migration are very important for the current wave of globalization, also among and within developing countries. In Africa, in particular, are many small countries that could benefit economically from fuller regional and international integration. But this fuller continental integration is constrained as no individual country is above a critical threshold of development to provide the catalytic impetus to sustainable mutually beneficial socioeconomic linkages.

Many countries in sub-Saharan Africa do not have the resource base to develop dynamic education systems for the knowledge economy. They also lack the base for vibrant private sector development. Socioeconomic integration within the Southern Africa Development Community (SADC) could enable all of these countries (including South Africa) to benefit from the comparative advantage they have and the larger market they would create for goods and services. They would be in a better position to tackle HIV/AIDS and other health challenges that do not respect national boundaries. Fragmented approaches, as currently practiced, are doomed to fail.

To add insult to injury, in some countries the university has been captured by elites who use their monopoly on access to higher education and employment as patronage. The public sector has not only reduced returns on investments in Africa but also has increased the already high risk in private investments. Capital flight, both human and physical, becomes inevitable. The unfortunate outcome of this vicious cycle is the creation of a top political elite, a very thin middle class, and an impoverished many. Democracy cannot thrive in such an environment. The absence of the robust voice of an independent middle class allows for even greater nonaccountability on the part of the ruling political elites.

The public good element of higher education was until recently not accorded the value it deserved. The economic return on investment approaches neglected the value-added of educated people to the quality of government and their essential role in sustainable development (World Bank & UNESCO 2002). We now know that good government, transparent and effective public institu-

tions, good public expenditure management, and accountability are central to development effectiveness.

Africa is also deprived of the equalizing effects of an outward labor mobility with the beneficial effects on domestic wages of the emigration outflows that are found in other parts of the world, such as migration from Ireland and Italy to the United States.[4] In addition, Africans also lose much of their university outputs. A few statistics will illustrate the gravity of the losses. Even though Africa's average higher enrollment rate is only 4%, compared to 81% in the United States, an estimated 30,000 Africans holding Ph.D. degrees live outside Africa. Although total immigration from Africa to the United States is quite small, immigrants from Africa consist primarily of highly educated individuals (about 95,000 of the 128,000 African migrants). The biggest migratory flows from Africa to the United States are from Egypt, Ghana, and South Africa. More than 60% of immigrants from these three countries have completed some form of higher education degree. Migration of those with only a primary education is almost nil. The migration rate of highly educated individuals for Ghana to the United States is a dramatic 26% and more than 8% in South Africa. These numbers are relatively small compared to Jamaica where 33% of those with secondary education and 77% of those with tertiary education leave the country. This means that Jamaica needs to produce five doctors to be able to keep one.

Public investments in human development in Africa will no longer make sense if these emigration patterns continue. Of all the medical graduates of the medical school in Jos (Nigeria) in 1998, 80% had left the country at the end of 2000. In Ethiopia, despite the increase in medical school students, there are large regions where there is only one physician per half a million people. To better visualize what this ratio means, think of countries with a population of around 10 million such as Sweden, Austria, and Greece. It would mean that these countries would have only 20 doctors instead of 20,000. The integration of global markets and more open systems for the movement of people and professionals, for all its positive effects for economic growth and reduction of poverty, has also caused a major human capital flight out of an entire continent.

To add insult to injury, some OECD markets and even governments are actively engaged in recruiting physicians and nurses from Africa for their own domestic markets. It is not difficult to see that poor countries are thus subsidizing richer ones. In more economic terms, medical curricula in African medical and nursing schools are starting to reflect "export" demand. Raising academic standards is a good thing in and of itself, but standards that are purely exter-

nally driven have costs. The costs in this case seem to be borne by the poor people in Africa.

A paradox that is perhaps even more painful is that of "tied aid" where the donor agencies that explicitly aim to help Africa to develop undermine the programs and the ability of the university to play a strong role in development. Tied aid is defined as bilateral aid that is given on condition that the expertise needed for undertaking development programs is provided by donor country nationals.

The World Bank estimates that tied aid to Africa amounts to $4 billion per year providing 100,000 technical assistance opportunities to work abroad. Tied aid undermines the institution building that traditionally occurs in universities in developed countries. Typically, such universities cover substantial proportions of their overheads by winning research contracts from both the public and private sector to design and implement development projects and policy interventions. The university in the developing world is, in this respect, denied the opportunity to serve as a development actor. Its hands are tied. The missed opportunities of tied aid related contract work add to the brain drain problem. How can skilled people remain stimulated if they are denied the challenges of tackling the development problems affecting their own societies? Development effectiveness is fundamentally undermined by this practice.

The inescapable conclusion is that socioeconomic and political differences between Africa and the rest of the world are not merely quantitative. The magnitude of the differences is such that they constitute a qualitative difference. Africa is caught in a vicious cycle of underdevelopment, and the exodus of its qualified people constitutes a severe leak in a bucket that is hard to fill. Still, there are policies which, if pursued by Africans and also by donors and the international community, can help Africa integrate faster with the rest of the world.

Policy Options

Globalization has important implications for higher education in all countries, but individual countries are not always in control of the major policy drivers to effect change for the better on their own. National governments have the primary responsibility for providing the resources for appropriate quality higher education systems. The university as a development actor can contribute to this process by getting its own house in order; for example, it can effect improvements in its internal efficiencies while also providing national leadership for policy reform within the education system as a whole. Improvements can come from better education and economic policies at home, the unfinished agenda of reforms. Developing countries bear some responsibility for the chal-

lenges they continue to face in human capital development by continuing to postpone deeper and often painful policy reforms.

The "failure to retain" human capital is more of a mixed bag as it relates to push and pull factors. Push factors lie within the domain of responsible governments in developing countries to ensure better investment climates, good governance, and adequate support for universities to fulfill their research, teaching ability, and learning functions. However, on the pull side, selective immigration policies and targeted recruitment practices by governments of recipient countries undermine the investments made by the development community.

I would like to propose policy reforms that loom larger than Africa and the university itself. More specifically, I would like to offer policy propositions in the following three areas:

- the development of standards for borderless education
- mitigating brain drain
- untying aid

Borderless Education: Setting the "Rules of the Game"

The rapid development of virtual providers of higher education programs on a global scale, the increasing mobility of professionals across national borders, and the absence of quality assurance infrastructure and capacity in many developing countries make it imperative to establish an international quality assurance framework that can set out minimum common standards worldwide. This is a first requirement. Such international accreditation systems are already being developed in some regions of the world. For instance, the higher education policies of transition countries in Eastern Europe are very much influenced by international coordination efforts to promote mobility, employability, and competitiveness. These characteristics result from the 1999 Bologna Declaration, the 2001 Prague Declaration, and the 2001 Salamanca convention. In South America, the Ministers of Education of the Mercosur countries (Brazil, Argentina, Uruguay, Paraguay, Chile, and Bolivia) have defined a minimum accreditation framework to facilitate the circulation of professionals from all member countries in their common labor market (World Bank 2002a). Second, countries could contribute towards the goal of establishing an international qualifications framework. The six Spanish-speaking countries of Central America, for example, are in the process of constructing a regional accreditation system instead of having each country creating its own quality assurance mechanism. A thematic, rather than a regional example, here is the current effort of the World Federation for Medical Association towards the establishment of "International Standards in Medical Education."

Third, in the past few years, the World Trade Organization (WTO) has spearheaded international efforts to reduce national trade barriers. The inclusion in these negotiations of an increasing number of goods and services is now raising fears in the academic community, especially in developing countries, that WTO rules for tradable goods and services might extend progressively to higher education services. The specter of invasion by virtual and other nontraditional providers is leading some governments to take protectionist stances against foreign providers. The following principles could serve to guide governments, licensing bodies, and higher education institutions: minimum infrastructure; clear mission statements; facilities and staffing requirements; appropriate, transparent, and accurate information on policy, study programs, and feedback mechanisms of foreign providers, including channels for complaints and appeals; the capacity for building partnerships between foreign providers and local institutions; and comparable academic quality and standards including the full recognition, in the home country, of degrees and qualifications delivered by foreign providers in a developing country.

Fourth, a related issue faced by higher education institutions in developing countries is that of intellectual property rights for online programs and courses and for access to digital libraries and digital information. The current debate involves two opposing views. On one hand, many universities in industrialized countries favor enforcing strictly commercial rules of protection of the intellectual ownership of digital courses and materials, either on behalf of the university itself or of its professors as authors of intellectual property. On the other, there are the proponents of a public-good approach who, following MIT's recent initiative to offer all of its course materials free of charge publicly on its Website, advocate flow-cost access to digital courses, textbooks, and journals for higher education institutions and scholars in the poorest countries. An agreement among six leading publishers of medical journals was recently announced which will give free access to their scientific journals to more than 600 institutions in the poorest 60 countries of the world and low-cost access to an additional 30 low-income countries. This is a magnificent example.

Another example is the African Virtual University (AVU), an independent nonprofit organization headquartered in Nairobi, Kenya. The AVU was started by the World Bank as part of its efforts to promote the use of information and communication technology (ICT) to enhance development effectiveness. It now enjoys a broader base of donor support with the Canadians and Australians as major donors. It gives people in 17 sub-Saharan African countries access to advanced scientific and technical information and knowledge, thereby promoting economic and social development. The AVU was launched in 1997 and now provides students and professionals with over 3,000 hours of interactive

instruction in English and French. More than 24,000 students have completed semester-long courses in technology, engineering, business, and the sciences; and more than 3,500 professionals have attended executive and professional management seminars on topics such as strategy and innovation, entrepreneurship, and e-commerce. AVU provides students access to an online digital library with over 1,000 full text journals. Over 45,000 free AVU e-mail accounts have been created and the AVU Website currently receives more than 1 million hits per month.

Many developing countries, especially low-income nations and small states, have limited resources with which to build up their information and communication technologies infrastructure. They also lack the economic and political leverage to negotiate favorable access and price conditions. Efforts here can include work with specialized international agencies, such as the International Telecommunications Union (ITU) and large communication technology companies, in order to support the efforts of the poorest nations. In this area, the World Bank was instrumental in negotiating the introduction of a special tax paid by big cruise companies to finance waste management programs on behalf of the small countries of the Caribbean (United Kingdom 2002). The bank could equally intervene on behalf of low income and small states to help them get preferential treatment from telecommunications firms to enhance access to ICT connectivity.

The World Bank is well positioned and willing to work with its partners in the international community to help facilitate or create a discussion platform and promote an enabling framework for global public goods which are crucial for the future of higher education in the developing world.

Mitigating the Brain Drain Risk

Brain drain can reduce the effective growth rate of human capital in the economy. Migration of human capital may even lead to long-run differences in both economic growth rates and the levels of per capita incomes across countries. To the extent that these two propositions are empirically valid, donor agencies should not contribute to this problem themselves by supporting programs and projects between higher education institutions in developing nations and universities in industrial countries that could generate a net loss in skilled human capital. Rules of conduct for such training programs could be defined and embraced by donor agencies and national governments to facilitate the return of professionals trained abroad with external funding.

These rules could even be extended to public agencies in donor countries, following the example of the British National Health Service, which has adopted ethical guidelines excluding recruitment from any country likely to suffer a negative effect on its own health care services. Another approach could be to

promote increased reliance on "sandwich" or joint degrees, whereby scholars from developing countries who study in a foreign institution receive their degree from their home institution within the framework of established academic partnerships. The University Science, Humanities, and Engineering Partnership (USHEPIA) involving the University of Cape Town and seven other sub-Saharan Africa sister institutions provides an interesting model of south-south sandwich programs. (See http://www.uct.ac.za/misc/iapo/ushepia.)

The experience of the German Academic Exchange Program (DAAD) is also valuable as a model. It includes additional funding that enables repatriating scholars to purchase a minimum set of equipment and materials needed to continue their pursuit of research interests developed as part of their studies abroad. This seed-funding creates opportunities for enhancing the working conditions of academics in poorer countries.

Finally, the possibility of introducing a cost-sharing arrangement to promote investments in the development of intellectual capital for a global skills market should be seriously debated. Such an innovation could go some way toward establishing collaboration between the developed and the developing world by leveling the playing field with regard to human capital formation and utilization.

The demographic realities are that the OECD country populations are getting older and are not likely to be replaced by higher birthrates, while most developing countries face a prolonged demographic transition. Mutually beneficial complementarities could be developed to meet the needs of both sides.

The current reality of public budgets in developing countries is that continuing to subsidize developed countries goes against the interests of both sets of countries by exposing them to all the risks of an unsustainable model. Continuing the present course also undermines the global public good element of higher education.

Untying Aid

Billions of U.S. dollars have been spent on technical assistance to the developing world. This comes in the form of official development assistance of approximately US$58 billion annually as well as significantly more in bilateral and multilateral aid. The fact that so much money has gone into this area with so little to show for it in terms of "capacity building" calls for a fundamental questioning of the approach adopted thus far.

The traditional use of foreign technical assistance to address human capital inadequacies does not appear to be yielding sustainable development outcomes. The focus needs to be directed at the development, retention, promotion, and

use of local talent. Brain-drain repatriation can be a more efficient policy than foreign technical assistance, but repatriation would also need to be complemented by reforms in the public sector's employment policies to reduce the incentive to migrate.

It seems that the global community is finally taking on the challenge of reviewing this question. The 2001 Bretton Woods Development Committee's Communique (the joint ministerial committee of the IMF and the World Bank) reemphasized the critical importance of trade for economic growth and poverty reduction, but the communique went further in two important respects (World Bank 2001).

First, the committee agreed on the particular significance of focusing on such "behind the border" issues as investment regulations, obstacles to efficient transport of goods and materials, standards and technical regulations, telecommunications, and business services. All of these issues hinge on the ability of developing countries to take advantage of the opportunities presented by globalization. The creation of this ability depends critically on whether the university can play its role as an actor in development by producing the expertise to develop and manage policy reforms.

Second, the committee welcomed efforts to "untie aid," including the recent *ad referendum* decision by OECD donors to untie their aid to the Least Developed Countries. This means that an increasing proportion of the $58 billion in development aid traditionally earmarked to fund donor country expertise can become available to the developing world's intellectual formation process.

Conclusion

In this paper I provided evidence that the world is a very diverse place. There are substantial differences among countries with respect to incomes, education systems, political institutions and, in a more dynamic sense, economic performance over time. I also argued that we are undergoing an integration process (via globalization) which is critically based on knowledge, to the text that the capability to create, access, and apply knowledge determines how successfully a country can address its numerous development challenges. In this respect, developing countries are falling behind industrialized ones in terms of low enrollments, low quality of education output, and low retention of qualified persons.

Unless universities become active actors in development, there will be a point at which this two-speed world will snap, as is very much the case in Africa today. The results can also be detrimental for those who currently ben-

efit from globalization; everyone may lose when collaboration is reduced. The university is at the heart of innovation, and its effectiveness as an actor in development depends on its ability to adapt to the rapidly changing global knowledge society. However, the university alone cannot turn the world around. Even the best university system in a developing country may fail to produce commensurate results in *that* country if push or pull factors are operating in a negative way. Examples include adverse political realities or plain economic calculations which give rise to undue cost/benefit differences between individual and social considerations. Furthermore, national policies that genuinely aim to foster economic development and improve governance and political conditions can be undermined by the international community to the extent that rules for technical assistance and foreign aid are tied to specific purposes that largely favor the interests of the donor country rather than those of the recipient one.

The global community has little choice but to address the destabilizing effects of the continuing growth in the gap between the developed and the developing world. Failure to do so will put the future for all of us at risk. Global competition cannot be allowed to run rampant. We are part of one world. Damage to one part affects the whole. The university as a development actor must be given the space to speak and act to promote greater collaboration and shared understanding before it is too late.

Notes

1 The views, findings, interpretations, and conclusions expressed in this paper are entirely those of the author and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent. The author thanks Ruth Kagia, Nancy Ruther, Jamil Salmi, Zafiris Tzannatos, and the participants of the conference for their valuable comments and suggestions.

2 It is difficult to count languages, but on some accounts there are over 1,000 languages spoken in Africa. Some 50 languages have more than half a million speakers each, but many others are spoken by only a few people (Gregersen 1977 ; Mann & Dalby 1987) see also http://www.sil.org/ethnologue/countries/Africa.html).

3 "University" typically refers to the flagship institutions of higher education, from undergraduate through Ph.D. and postdoctoral levels as well as professional schools. However, for the purposes of this paper, "university" will refer to the general concept of higher education rather than a specific type of institution.

4 Emigration is estimated to have raised Irish wages by 32%, Italian by 28%, and Norwegian by 10%. Immigration is estimated to have lowered Argentine wages by 22%, Australian by 15%, Canadian by 16%, and American by 8%. Lindert and Williamson (2001) conclude from these results that all of the real wage convergence before World War I was attributable to mass migration, about two thirds of the GDP per worker convergence, and perhaps one half of the GDP per capita convergence (pp. 16–17).

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Higher Education, Society, and Government: Changing Dynamics

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Abstract

Reform strategies for Africa's universities are adjusting to three macro-trends: market pressures, demographic forces, and changing donor perspectives. Market-like definitions of accountability with their related performance indicators—focused less on what is known than on how fast and effectively knowledge is transformed into technologies, skills, and economic growth—are generating unprecedented institutional diversification in African higher education. This occurs as demographic forces threaten to deplete Africa of its most talented students who, if given the chance, will migrate for training and work. In the growing international competition for students, the balance of trade will not favor Africa. Those donors who remain committed to Africa are searching for models in which Africa's universities reposition themselves as indispensable bridges between the national economy and the international knowledge economy. Ensuring that universities—despite market and demographic pressures—continue to promote the "public good" in higher education and advanced research should be the strategy of choice.

Résumé

Les stratégies de réforme destinées aux universités africaines s'adaptent à trois tendances macro-économiques : les pressions du marché, les forces démographiques et les perspectives changeantes des bailleurs de fonds. Les définitions de la responsabilité liées à la notion de marché, et leurs indicateurs de performances (qui portent moins sur ce qui est connu que sur la manière rapide et efficace dont la connaissance est transformée en technologie, savoir-faire, et en croissance économique) provoquent actuellement une diversification institutionnelle sans précédent dans le milieu de l'enseignement supérieur.

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Ceci est en train de se produire à un moment où les courants démographiques menacent de vider l'Afrique de ses étudiants les plus talentueux, qui, s'ils en ont l'occasion, risquent de migrer pour des besoins de formation et de travail. Dans le cadre de la compétition internationale grandissante, la balance commerciale ne favorisera pas l'Afrique. Ces bailleurs de fonds qui restent engagés envers le continent sont à la recherche de modèles au sein desquels les universités africaines peuvent se repositionner, en tant que liens indispensables entre l'économie nationale et l'économie internationale de la connaissance. La meilleure stratégie consisterait à faire de sorte que les universités (malgré les pressions démographiques et celles du marché) continuent de promouvoir le « bien public » dans le domaine de l'enseignement supérieur et de la recherche approfondie.

The Threshold Question

Much has happened in the past 500 years: enormous population growth, from about one-half billion to 6 billion; phases of vast population movement, both rural to urban and old world to new; the rise of the nation-state system, now 200 or so independent (or striving to be independent) sovereign states; and the pervasiveness of secular, modern ideologies and deductive science with its endless stream of technologies that, many believe, is creating a new world economy.

Yet during this half-millennium, the basic model of higher education has changed hardly at all: direct, face-to-face exchange between the learned and the learners, heavy reliance on written texts that summarize previously established knowledge, and physical sites to which faculty and students come to reside. And, at least since Wilhelm von Humboldt, three core principles have been generally accepted: unity of research and teaching, protection of academic freedom including both the right of free inquiry by scholars and the right of students to choose their course of study, and the centrality of arts and sciences or liberal education.

This stability is a remarkable fact. There have been enormous changes in political, economic, and social life, in worldviews, and in the size and distribution of the human population; yet the institution that produces and disseminates knowledge looks much as it did centuries ago.

The threshold question, then, is whether higher education in general, and universities more particularly, will continue to be as resistant to change as in the past. Many commentators presume not: They argue that the "knowledge revolution" is going to cut more deeply than prior transformations. The argument is plausible because, after all, higher education is about knowledge. If we are entering a new phase of human history because knowledge itself is being

differently produced, disseminated, and used, it logically follows that the institution responsible for knowledge can hardly stand outside. Or so goes the new conventional wisdom. Higher education will change dramatically or be bypassed. See, for example, the carefully constructed argument that universities have to shift from the traditional model of knowledge production to a new model of knowledge configuration (Gibbons 1998). Or note that the widely circulated 14-page summary of the World Development Report, *Knowledge for Development,* does not mention universities until page 10 and then only in a passing reference to two virtual universities (World Bank 1999). Another World Bank document has as its opening sentences: "Imagine a university without buildings or classrooms or even a library. Imagine a university ten thousand miles away from its students." These sentences, and there are many more in this vein, presume that the old model is giving way "under the impact of globalization, knowledge-based economic growth, as well as the information and communication revolution" (Salmi 2002).

From that perspective, another report, *Higher Education in Developing Countries: Peril and Promise* (Task Force 2000), is hopelessly naive in its many echoes of the Humboldtian vision. This report urges adaptation but not transformation. It particularly stresses that the responsibility of universities to continue a public-good tradition offers good reason for the change-resistant nature of universities that should not be casually or swiftly set aside.

The threshold question is best approached by distinguishing universities from the much larger and rapidly expanding sphere of tertiary education, as most of our familiar assumptions about the change-resistant nature of universities are drawn from historical periods when the term "universities" was interchangeable with the term "higher education." The term "tertiary education" points to a much more inclusive enterprise, one that includes universities but which extends to the full array of postsecondary training and educational institutions. The initial point, of course, is that universities have a steadily shrinking share of the educational market. This is because many institutions that make up the tertiary system are, in fact, a product of the knowledge economy and adapt quickly to its demands, e.g., corporate universities, distance learning, for-profit providers, and profession-specific institutions.

A useful working hypothesis is that universities, though not the tertiary system more generally, will remain change resistant. Universities are and will continue to adapt, as they have in the past, but not in a manner that discards proven practices that stretch back across the centuries. To anticipate the argument, there are public goods to be secured, such as nonproprietary research, training programs (e.g., for public school teachers) that serve the public interest, and offering educational opportunity for those who cannot pay market rates.

The tertiary educational system as a whole underproduces these public goods. Universities are the segment of the larger educational system that continues to produce public goods; this position gives universities their staying power.

Africa's Threshold Questions

What is true generally is seldom true for Africa, which takes us to Africa-specific questions. The most pressing, of course is: Can Africa catch up? The litany of statistics is depressingly familiar. Pick any economic or educational datum and learn that Africa is behind—and often way behind—the advanced economies. The United States has just under 5% of the world's population but more than a quarter of its Internet connections. Sub-Saharan Africa has twice the proportion of the world's population, but only 0.1% of the Internet connections. Tertiary enrollment in the world's high-income countries is approximately 60%; in sub-Saharan Africa, it is one twentieth that level, and so forth.

African countries have struggled to catch up by adopting two difficult-to-manage (and finance) features of education: massification of the universities and institutional diversification in the tertiary system more generally. Despite, or perhaps because of, these changes, Africa's advanced education system remains weak when compared to other world regions and small in relation to population needs.

This pattern leads some commentators to suggest that Africa might be less resistant to the demands of the new knowledge economy and more open, if only from a position of weakness, to institutional designs compatible with the tasks of the 21st century. This is the hope that a leap-frog strategy is available. This counterintuitive argument is that Africa can catch up because the distance between its educational achievement and infrastructure and that of most of the rest of the world is truly substantial.

The remainder of this essay considers three broad macro-trends—market pressures, demographic constraints, and donor perspectives—that influence whether and in what manner Africa's universities can be competitive when measured against world standards.

Market Pressures

We start with the simple but familiar schematic that distinguishes the three broad domains of human organization: the state or public sphere, the market or economic sphere, and the society or private sphere. The defining characteristic of the state is coercion. The state's power to regulate behavior and to extract resources is, of course, presumed to be linked to its responsibility for such public goods as security, infrastructure, and welfare. The defining characteris-

tic of the market is profit-seeking on the basis of which it produces private goods and benefits.

The third sphere, civil society, has recourse neither to coercion or profit-making. It organizes human behavior and mobilizes resources by serving the public good through individual and communal action that is voluntary (not coerced) and charitable (not profitable). Of course this raises the basic question always asked of the civil sector: If the state is already responsible for the public good, why bother with a voluntary, nonprofit sector trying to duplicate this task? The standard answer is that, the more the state provides public goods by taxing citizens and regulating markets, the more it coerces. And because freedom from state coercion is independently desirable, throughout history significant public goods have been produced and distributed outside the state and outside the market.

Historically, higher education was a public good largely provided in this manner. Monasteries in Catholicism, *waqfs* in Islam, and Brahmins in Buddhism come to mind. And not just the religious institutions. Private benefactors have established institutions of higher learning since antiquity. Plato's bequest of land endowed his famed Academy. Epicurus did likewise in endowing a school that survived for 600 years. The renowned library of Alexandria was funded and sustained by the Ptolemies. The first teaching hospital, Hotel Dieu in Burgundy, was established in 1443, the gift of a highly valued vineyard that produces vintage burgundies to this day. This tradition continues into the modern period: Yale, Brown, Stanford, and hundreds of other American universities were founded and funded by the private sector.

The private-public balance shifted in the modern era. The public university as a responsibility of the national or provincial government has come to the fore, almost exclusively in some countries (Germany) and alongside private universities in others (the United States and Great Britain). The new nations of Africa that emerged with the break-up of the European empires were quick to establish public, national universities.

Why recount this familiar story? To remind us that the boundaries separating state, market, and society are porous, contested, and ever changing. Much of public policy and law is about policing what occurs at the borders separating the three sectors and about determining what functions will be performed in which sphere.

Policy toward higher education in the 20th century facilitated a steady movement of universities from their earlier home in the civil (largely religious) sphere to an alternate location within the public, governmental sector. This movement did not challenge the fundamental premise that education is a public good. As we enter the 21st century, policy is opening higher education to the market,

that is, to commercialization and private profit-making criteria.[1] It is unclear whether the recent rapid growth of for-profit higher education services indicates a sea-change, or just an adjustment at the edges. If the former, the age-old responsibility of universities for the public good is under challenge.

What explains the increased role of the market in tertiary education? What might be the special consequences for African universities?

The standard justification for moving what were public responsibilities into the market is that the market can do it better. "It" refers to nearly any human activity or purpose imaginable, while "better" means higher economic returns for whatever effort is involved. The market is assumed to have a better bottom line, that is, a better mechanism for measuring performance and enforcing accountability. Profit and market share on the upside; poverty and bankruptcy on the downside. You know where you stand in the market. Success is swiftly rewarded: Customers flock to your products, investors push your stock values up, and workers seek employment in your firm. Failure is swiftly punished, measurably so. Obviously it does not always work this way, but the theory is robust and the performance indicators have a face validity hard to deny. Certainly market-like definitions of accountability and related performance indicators are rapidly spreading across the tertiary education system. Here is how one commentator puts it:

> While it is true that universities still retain their role as the "conscience of society," the critical function of universities has been displaced in favor of a more pragmatic role in terms of the provision of qualified manpower and the production of knowledge. The author continues: "The new paradigm is bringing in its train a new culture of accountability as is evidenced by the spread of managerialism and an ethos of value for money throughout higher education systems internationally." (Gibbons 1998: 1)

This viewpoint is pervasive in the literature on tertiary education. The relevance of education is to be measured primarily as the contribution made to national economic performance. The old idea of the "development university" has returned in a new and much more potent guise. For the individual graduate, what matters is lifetime earning power. This is the preferred return-on-investment indicator. Knowledge is a product that is monetized in the market place. "The assumption . . . is that the new economically-oriented paradigm is not going to be replaced and that the trend towards increasing accountability will not be reversed" (Gibbons 1998: 1). The resulting culture of accountability is less about what is known than about how quickly and effectively knowledge is converted into technologies, employee skills, and economic growth. Rather

than measure educational performance in terms of years completed, there is a shift to outcome-based standards, that is, marketable skills.

It is taken for granted that tertiary education will adapt. Indicators include the partnerships linking research universities with for-profit firms, the steady shift of educational costs from the public to the private sector, the rapid growth in specialized and largely vocational training programs, the budget rules that put every program "on its own bottom," the growth of proprietary research arrangements, and the emergence of for-profit educational services, including a company that buys and sells universities.

The steady introduction of market-like accountability mechanisms influences what is taught, to whom, over what time frame, in what manner, and how instruction is assessed. It penetrates the research culture, affecting what research is funded, how priorities are set, who controls the new knowledge, and how knowledge is disseminated. Internal institutional structures and cultures adapt—for example, in a shift from decentralized faculty governance to centralized management, in the expansion of a part-time labor pool of adjunct professors, and in the shrinking of the core liberal arts curriculum and the expansion of professional and vocational training.

The most significant adaptation is what is happening to the sector as a whole. There has been expansion in the number of different kinds of institutions that now comprise tertiary education: corporate universities, distance learning, virtual universities, vocational schools, and continuing education programs, among others. This diversification is not limited to teaching and credentialing but characterizes research as well: government laboratories, think-tanks, corporate research and development (R&D), networked firms, scientific institutes, and international programs. Tertiary education now includes a large number of institutional forms that barely, if at all, resemble the traditional university. There is every reason to expect yet more institutional forms, as mergers and combinations not yet designed seek out a market niche.

With this diversification comes a proliferation of stakeholders. A large and growing number of groups have a stake, often an economic stake, in how well tertiary education is functioning. In matters both of curriculum and research, there are simply many more interests with which to negotiate the terms of education and the measures of its success. These multiple links to the market with its varied stakeholder groups are a large part of the momentum behind the culture of accountability.

The diversification of the educational sector occurs in the context of massive changes in knowledge production. The for-profit sector, primarily but not only in the OECD countries, is home to a multibillion dollar knowledge industry, one that is much more closely tied to labor market needs and to technologi-

cal innovation and application than are education institutions. It is widely assumed that the market for information and knowledge intensive products will continue to grow and that this growth will create yet more organizational forms that will compete with the traditional institutions of higher education.

Ironically, just as knowledge acquires greater value, the near-monopoly that universities have enjoyed in knowledge production and education is eroding. Under these circumstances, the challenge to tertiary education in Africa is particularly acute. There is no aspect of African tertiary education that is immune, but we limit discussion here to four issues that specifically challenge African universities.

Accountability

The greater accountability required by the new conditions does not necessarily mean less autonomy for universities, though faculties are fond of asserting that there is a direct tradeoff between the two. Accountability, properly managed, can increase autonomy. To report clearly to supporters, to account for the spending of funds, to justify priorities; and to insist on quality controls can build the public trust that leads to more not less autonomy. At a time when universities are in competition with other providers of educational services and other sources of knowledge generation, more attention to accountability is strategically wise.

In this regard, the university in Africa is disadvantaged. There is the difficulty of overcoming an image of aloofness, elitism, and selfishness, whether merited or not. There is the task of actually defining performance and then producing measures that can be publicly reviewed. These university-specific tasks are made more difficult by Africa's generally poor track record of establishing accountability in any sector: government, military, industry, professional services, and even the nonprofit arena. In the absence of a widespread understanding of public accountability, universities have much to overcome.

The natural inclination will be to gravitate to performance as measured in the marketplace, by emphasizing short-term economic benefit. But being quick to cooperate with market-derived measures will erode the public-good tradition in higher education, which (see below) is not in the long-term interest of African universities.

Partnerships

The market environment in which universities often function puts a premium on linkages between universities and government laboratories, industrial R&D, think-tanks, independent scientific institutes, and the like. We have moved from "publish or perish" to "partner or perish." These multiple external networking patterns obviously require a robust research presence in settings outside the

university, in both government and industrial laboratories. These are present in developing countries and are widely credited with some of the spectacular advances in new knowledge in recent decades, especially in bio-medicine, communication, materials, and transportation. These nonuniversity research sites also provide for expanded educational opportunities, through internships, new forms of postdoctoral training, and, of course, continuing technical education. From this dynamic mix are emerging new, powerful models of research and advanced education.

These models require not only strong universities but also a system external to education that is engaged in the core activities of universities, that is, in research and training in fields such as agriculture and health. Such is not widespread or particularly strong in Africa. The danger is that Africa will remain wedded to traditional assumptions about university education less because it is resistant to change than because the conditions allow for little else.

Continuing Education

One of the remarkable features about tertiary education in the developed countries is its agreeableness toward continuing (adult) education. The old model of adult education was civic in its purpose. It was to allow those who had missed out on the benefits of a liberal education to have this experience in combination with their work life. Thus, the evening class or "night school," as it came to be known, was invented. Over time this civic model was expanded as the middle class sought out continuing education opportunities in book discussion groups, museum courses, or university-arranged travel. These programs linger in wealthier countries, but the new energy behind continuing education is skill based rather than civic minded. Continuing education is described as the friend of technological change, as the process though which the labor force upgrades its skills in line with new technologies of production and marketing. In this model, what works best is a continuing education—whether located in the local college, a for-profit provider, or the firm itself—that is closely aligned with job-based skill requirements.

Africa, not being locked into an earlier civic model of continuing education, is well positioned to adapt to the newer model; but as with the point just made about partnerships, this requires an economy that itself is geared to technological innovation. Where that is weakly present, there is no venue for a more skill-based or vocationally oriented system of continuing education to emerge.

Funding

Everywhere, of course, the costs of education are being shifted from the public to the private sphere. Mostly this is fee-based, whether in the traditional public subsidized university or in the newer providers of educational services. Subsidized education is also available in the corporate sector, in church-based institutions, and from an array of other nonprofit actors. The rationale for this shift has been developed in many World Bank documents. It is often closely related to rate-of-return analyses that stresses the individual rather than social benefits of advanced education.

But a resource-limited public sector often means a resource-limited private sector. Shifting the cost of education to the private sector and linking it more directly to the market, does not solve the resource problem; it only relocates it. Just as the public sector has to decide what priority to assign to education vis-à-vis alternative claimants, so now will families, corporations, charities, churches, and foundations. Again, the challenge in Africa is compounded. In Africa, the state has been a dominant presence, and the market and civil society have been comparatively weak. Shifting the cost of university education to those sectors places enormous demands on their resources and priority-setting mechanisms.

To draw the general point, embedding tertiary education in the market has consequences for university reform. There is no way to reform, improve, or otherwise transform universities solely from the inside out. The challenge—not an easy one—is designing educational policies that take into account forces beyond the educational sector.

Shifting from economics to demography makes this point even more clearly.

Demographic Constraints

Replacement migration[2] is a term not yet widely known; it will become so. First, the term draws attention to below-replacement birth rates in virtually all of the OECD countries. The United Nations projects negative population growth for 31 European nations. For example, under current (median) U.N. projections, in the next half-century Italy's population will drop from 57 million to 41 million and that of the Russian federation will decline from 147 million to 121 million. Accompanying these population declines is population aging. A third of the population in Italy will be over 65 by midcentury. Because of aging, the declines tend to be even more dramatic for the working-age cohort. Similar patterns hold for large sections of East Asia as well, especially Japan and South Korea. It is these fertility patterns that lead to discussion of replacement migration (Population Division, 2000).

As defined in the U.N. report: "Replacement migration refers to the international migration that would be needed to offset declines in the size of the population, the declines in the population of working age, as well as to offset the overall ageing of a population" (Population Division 2000: p. 1). These numbers get very high. To keep constant the size of the working-age population in Italy, for example, approximately 370,000 new migrants a year would be required. Germany would require just short of a half-million migrants. For countries such as Germany and Japan with comparatively low percentages of women in the workforce, increased participation of women could sharply reduce the number of new migrants required.

The United States has been an early practitioner of replacement migration. Its native stock stopped reproducing at replacement level three decades ago, but the adjustment in immigration policy was swift. The last three decades witnessed increases in the U.S. foreign-born population not seen since early in the century. Immigration plus higher than replacement fertility among the foreign-born added nearly 33 million residents between the 1990 and the 2000 decennial censuses, with especially high levels of growth among the working-age cohort. How likely is it that replacement migration will occur across the OECD countries? If it does, how likely is it that Africa will supply a large number of the new migrants? And, if this were to happen, what are the implications for African universities? These are complex questions that take us well into speculation, but they are important enough to merit informed guesses. The demographic trends themselves are reasonably clear.

A version of replacement migration took place in the half-century just prior to World War I, with population movement from Europe and Asia to the industrial economies and frontier agricultural opportunities in the New World, especially Australia and North America. It holds lessons for what might happen between now and 2050. The demographic transition is defined as the change from high fertility and high mortality in the preindustrial period to low fertility and low mortality in the postindustrial period. At the beginning of the transition, changes in fertility rates lag behind changes in mortality, and there is a surge in the size of the youth cohort. For Europe this phase occurred just as the new world needed labor, and there was mass movement of a working-age population to Australia, Canada, and the United States.

Of course, large migratory flows are not caused only by changes in population composition associated with the demographic transition. Excess labor supply in sending countries coupled with excess labor demand in receiving countries generally implies major differences in living standards. These factors added to migratory pressures in the 19th century.

To return to the 21st century and replacement migration, Jeffrey Williamson (2001:1) observes: "Demographically-young nations tend to send emigrants, while demographically-old nations tend to receive them." Although policies matter, he continues:

> If liberal immigration policy allows this process to play itself out, mass migrations from emerging nations in the middle of their demographic transitions will always flood the advanced nations who have completed their demographic transitions. If restrictive immigration policy tries to choke off this process, then illegal immigration will try to circumvent it.

That is, demographic and economic realities indicate that Europe will, strong opposition political movements notwithstanding, hesitantly move toward replacement migration. The pressures to do so are heightened by the fact that the United States economy appears quite prepared to be flexible with respect to immigration, already having fashioned policies that satisfy low-end markets for service workers and high-end markets for engineers and skilled technicians in the information and health sectors. It is not likely that Europe can continue to cede this advantage to the United States. Competition for foreign students is a factor as well. The region that attracts the best students from around the world, and then keeps them, has an economic advantage.

If Europe follows North America in adopting replacement migration strategies, how likely is it that Africa will supply a large number of the new migrants? Williamson (2001:8) provides an informed prediction:

> The same fundamentals that drove European emigration a century ago are even more powerful in Africa today. After all, Africa has undergone a more dramatic demographic transition than did Europe a century ago. Thus, population growth rates in Africa are expected to remain above 2% for the next two decades, rates that are almost double those of the poor parts of Europe sending out migrants before World War I. The contrast is even more striking when rates of increase of young adults are compared, and these, of course, are the ones most likely to move. Furthermore, the wage gaps favoring Europe over Africa today are more than double the gaps that favored the New World over poor Europe in the 19th century. If Africans are as responsive to migration fundamentals as Europeans were a century ago, then large outflows should be taking place now and larger ones should be expected in the future.

Williamson is quick to note that restrictions on immigration in the high-wage OECD nations can prevent this flow from happening at the pace and in the amount that the migration fundamentals would suggest. But faced with serious

economic dislocations, it is likely that Europe will adjust its immigration policy. On the assumption that policy will catch up with demographic realities, we can explore what this might mean for postsecondary education.

Historically, emigration has been age and ambition selective. It is the young with drive, energy, imagination, and determination who are more likely to strike out for new places and new possibilities. If this pattern repeats itself in the 21st century and operates on migratory flows from Africa to Europe, the next quarter to half century will witness a steadily increasing proportion of Africa's best and brightest arriving in Europe or North America for their postsecondary education. There will certainly be spaces in the OECD education systems. Adjustments in the United States have already led to levels of educational attainment for Asian Americans that outpace native whites. If Africans do arrive in large numbers and find their way into tertiary education programs, they are not likely to take newly acquired skills back to low-wage countries.[3]

In the United States, there is already sharp competition in some labor sectors (including higher education itself) for the best foreign student graduates. The employment market in the OECD countries will, under the demographic scenarios noted above, have ample space for a young educated workforce and will turn to their own tertiary education institutions for that workforce. The time frame for these demographic changes is a half-century or so but could easily leave universities in Africa to compete for and educate only those who stay behind, a less impressive lot.

Of course, even without migration, Africans can begin to prepare themselves for employment opportunities in the OECD countries, at least in those fields served by the distance education market. If, for example, meeting the standards of a multinational accounting firm is more likely to be achieved in a distance education course provided by that firm than by going to the local university, the choice is easy for the job aspirant.

Alternatively, an increasingly integrated global economy may allow for workers to remain in their current home country, while producing goods and services under the auspices of multinational firms. This scenario, too, would have large consequences for tertiary education. It would hasten the standardization of curriculum, degrees, and certification that has already begun. Here the new technologies of distance education play a role. They are well suited to accelerating cross-national standardization in postsecondary education as students everywhere can be taught similar materials and tested against common criteria.

Migration and distance learning stimulate a world trade in educational services. Overseas training is not new, but there has been an order-of-magnitude shift, with many new actors on the scene. The importing countries are no longer

limited to Britain, France, the United States, or Russia. Australia aggressively recruits Asian students. It was hurt by the economic downturn across Asia in the late 1990s and is now looking to Western Europe, Latin America, and Russia for tuition-paying students. Australia now earns $2 billion a year from foreign students, equal to its earnings on the export of wheat. In Europe, Germany and the Netherlands now offer courses in English, not to attract American or British students but to attract students from Taiwan and South Korea. Indian universities actively recruit from Southeast Asia, where they increasingly find that the competition is Japanese rather than Euro-American. The United States continues to be the favored destination. U.S. universities enroll approximately 450,000 international students annually but has seen its market share decline from 39% in 1982 to 30% in 1995, the most recent figures available (*Chronicle of Higher Education,* 2001, p. A45).

Nearly every country exports some of its students for advanced training; but small countries and, irrespective of size, the poorer countries are especially dependent on overseas advanced training. Thus, 90% of all African Ph.D. candidates are getting their training off-continent. Asian candidates are scattered across 50 host countries.

What seems certain is that efforts to improve university education in Africa must take into account the growing international competition for students. The balance of trade will not favor Africa. Its small and weak university system will not be competitive. The most talented Africans will seek degrees elsewhere; and few, if any, Europeans or Asians will seek an African degree.

In linking demography to university practices, there are a number of uncertainties, making prediction a hazardous enterprise. But policies designed to improve higher education in Africa will have to track and adjust to the magnitude of emigration, especially of the postsecondary cohort.

Donor Perspectives

For any university system other than Africa's, we would not need to treat donor perspectives as a macro-trend.[7] But for universities in Africa, the role of external support has been critical. It is hard to find a document on university reform that did not include a section urging greater support from international donors, and a brief retrospective puts current issues in context.

National Elite Universities, Phase I

In the 1960s, universities of the newly independent African nations were a favored target of external aid. The contribution came in the form of personnel as well as funds. It was guided by a reasonably coherent idea of what was to be achieved. Universities, then public, were to become autonomous institutions

of high quality and free inquiry. Humboldtian in design, they would house training and research; and most of the nation's advanced research would be conducted in the university setting. If the first generation of government leaders had been trained abroad, the sooner the successor generation could be trained in the local university the better. The favored instrument of the aid community was the staff development fellowship.

The new university in the new nation would look and feel like the leading universities of the colonial powers, that is, of Britain, France, and Belgium. The early arrival of the United States as a major donor, particularly the private foundations, did not radically change the model. For example, the attempt by U.S. aid agencies to introduce traditions from the land-grant system did not get much traction.

Donors and the first wave of postindependence leaders took for granted that an autonomous, prestigious national university was itself an indicator of development. Like a seat at the U.N. or a national airline, the very presence of the university demonstrated that the new nation had arrived and that development was underway.

The Development University: Phase 2

Although the investment in universities carried into the 1970s, the model of the independent, high-prestige university did not. It was replaced by or blended into the notion of the "development university," which was to be self-consciously linked to the development goals of the society. Community service was integrated into the undergraduate curriculum. Advanced degrees (nearly always at the M.A. level) were no longer the monopoly of the discipline-based departments but now could be earned in the well-funded special institutes of development, demography, economic planning, or agricultural sciences. Research opportunities were linked with specific national needs: integrated rural development, agricultural extension service, public health programs, and five-year economic plans. The university would contribute less by basic research and training future leaders than by providing answers to short-term policy needs and by meeting the needs of five-year manpower plans. These new, instrumental purposes were external to the traditional university culture. Although the development university was initiated in active cooperation with enthusiastic donor agencies, enthusiasm soon gave way to donor disillusionment. If an investment is justified in terms of short-term payoff, doubts set in quickly when the payoff does not occur promptly.

Three other factors contributed to a changed relationship between external donors and the university sector.

First, donor investments became more selective and more project focused. These investments were designed to be an element in a food security program or a civil service reform or a public health strategy. Even though funds continued to flow to higher education, the university as university—its infrastructure, its liberal arts mission, its responsibility to train future leaders—fell out of favor in donor rationales.

Second, the university lost its privileged place in donor priorities. Led by the World Bank's aggressive introduction of rate-of-return considerations, higher education found itself being unfavorably compared to primary and secondary education. Funds were reallocated, often outside the education sector altogether, to NGOs and other service-delivery initiatives. To a limited but not insignificant extent, the disillusionment with the university as a direct instrument for development became generalized as skepticism about higher education itself.

Third, the belief that university education is, finally, an investment in quality selection of people and ideas—that is, in the rigorous application of elite criteria—was confounded by a new rhetoric of egalitarianism and the quasi-populist political movements that saw university elitism as a convenient target.

The development university model gave way to an altogether less coherent sense of why and how donors should invest in higher education. This is clear in how universities were affected by sequential decline of the two initial models:

- The development university notion invited a closer link to government priorities, with confusing consequences for the commitment to free inquiry promoted in the initial model.
- Project funding led to contract research and the faculty reference group was not peers but program officers in the external funding agencies, who were now authorized to deal directly with the individual researcher. This development led to a severe weakening of peer review research culture and thus of science itself.
- Project funding also tended to displace research from the university to nonuniversity settings—to nongovernmental organizations engaged with rural poverty or to policy units associated with government ministries.
- With the decline of donor aid, which had operated as an important subsidy to higher education, the university was vulnerable to an unexpected public scrutiny that focused on the true (high) costs of higher education. In the midst of a general economic decline, funds to sustain university education were hard to come by.
- The shifts in donor priorities occurred during a period of substantial demographic pressures that transformed many public universities from small and privileged places to large and crowded places, often leading

to student unrest. Universities were politicized in the process; quality criteria and faculty governance suffered.

Damage Control and University Reform, Phase 3

Accompanying the shifts in donor priorities following the disillusionment was a much greater degree of donor pluralism. That is, if the 1960s were marked by donor coordination in pursuit of a common vision and the 1970s were marked by a common commitment to a new model, the next phase was marked by much less coordination.

Inconsistencies were hard to avoid. One donor invests in staff development to build up a university department, and another donor funds regional centers of excellence that drain the best faculty from the university setting. One donor stresses south-to-south training and research networks, and others are determined to lure the best talent to training or research programs centered in the northern countries. Some external funds continue to emphasize the central importance of public higher education, while others busily set up competing institutions in the private sector.

The term that perhaps last describes this phase is damage control. Donors worked to correct internal inefficiencies, tried to interrupt both external and internal brain drain, and attempted to compensate for the research failure of the universities by creating research networks, improving learning habits, helping particular institutions catch up with the technological revolution, and shielding research from the excesses of political interference. All of these efforts fell under the umbrella view that African universities needed reforming.

But reform to what end? Against what vision? In pursuit of what purpose? With what model of university education in mind? It comes as no surprise that the donor community is without a common vision of what is right for African universities. In this, they are simply reflecting the times. Since the demise of the development university model, there has been a search for how best to situate the university in a tertiary education system that is transforming the landscape. International conferences, task force reports, and white papers have struggled to describe the role of the university in nations facing many demands with few resources, nations in which the public sector is weak and market mechanisms are not yet mature.

The task for Africa is not made easier by the much more generalized effort to define the mission of the university in the new world economy. The OECD countries have their own white papers and task force reports trying to sort out a mission that has become fuzzier, more diverse, harder to specify and more difficult to assert and defend. Even the enormously robust university system in the United States, with its 4,000 institutions, is scrambling to define itself in a

world where corporations have their own universities, where "click" institutions compete with "brick" institutions, and where the market is quick to see for-profit opportunities in a sector traditionally ceded to the state and nonprofit sponsorship.

Universities and the Public Good

There is, or should be, one constant in this search for a mission.[5] Universities—though not tertiary education more generally—will continue to anchor the public good historically represented in and through advanced education. The previous discussion suggests some of the pressures that have thinned out the public-good dimension of higher education in recent decades. A major contributor is the expansion of tertiary institutions that are defined and defended as sites for personal advance and private benefit.[6] While this aspect of advanced education is not new and not unwelcome, to present it as the primary if not sole justification for postsecondary education has the consequence, perhaps unintended, of neglecting an equally long tradition of public support for institutions that advance the public good.

For many countries, especially those of Africa, being competitive in the international global economy has replaced the traditional "nation-building" task as the criteria against which the contribution of the university is measured. We are familiar with the indicators, a number of which were suggested above: market-sensitive curricular reform, rewards to entrepreneurship, fee-based financing, subcontracting educational services to the private sector, managing universities according to private-sector standards, the expectation that universities can continuously increase the numbers being taught without any increase in teaching staff ("more with less"), and blurred boundaries between the university and the for-profit sector through new partnerships, etc. As summarized by one observer, these trends

> are bringing universities in line with other social arrangements designed to position national economies for greater global competitiveness. . . . [They are] functioning as a powerful and influential global paradigm, shaping higher education policies and practices in many developing country economies, despite huge social, economic and historical differences [from one country to the next]. (Singh n.d.: 1)

The independent Task Force on Higher Education in Developing Countries, whose report I cited earlier, was sufficiently alarmed that it devoted an entire chapter to "higher education and the public interest," pointing out the several ways in which universities continue to have a responsibility for the public good. This analysis started from the view that universities offer a mixture of private

and public benefits. In line with traditional World Bank analysis, it acknowledges that it is a waste of public funds to pay for those elements that offer private benefits, because prospective beneficiaries will provide the funds. But the same logic underscores that it is a serious mistake to presume that private investment will secure the public or social benefits of universities. Such a presumption defies economic theory. Public returns depend on public investment. Jamil Salmi notes that government support is justified because higher education generates "external benefits that are crucial for knowledge-driven economic development" and also because of "social benefits accruing from the construction of more cohesive societies" (Salmi, 2002: 8).

In the rush to adopt funding strategies that shift the cost-burden from the public sector to the individual beneficiary, the ancient justification of advanced learning as a public obligation recedes from view. This danger is magnified where it is assumed that market forces will supply whatever it is that society wants and needs. Markets, we are repeatedly instructed by economists (and by historical experience), underinvest in public goods.

The Task Force Report (2000) presents an illustrative list of public goods traditionally associated with universities. They can:

> unlock potential at all levels of society, helping talented people to gain advanced training whatever their background;
>
> create a pool of highly trained individuals that attains a critical size and becomes a key national resource; address topics whose long-term value to society is thought to exceed their current value to students and employees (for example, the humanities); and provide a space for the free and open discussion of ideas and values. (p. 28).

Lists such as these appear in more and more documents about higher education, a sign that these "taken for granted" purposes are, in fact, no longer taken for granted but need to be reasserted.

There is the hopeful possibility that the public-goods argument will find a fresh rationale as universities reposition themselves to advance international economic competitiveness, and that this rationale will be especially compelling for Africa. For the foreseeable future, the only way in which Africa can participate in the international knowledge revolution will be by protecting the public good aspect of knowledge production. (See Ndulu's similar conclusions, this issue.)

There is a worldwide system of basic knowledge production, widely available in both print and electronic media. It follows from the simple fact that the results of publicly funded basic research cannot be held for the benefit only of the nation that has invested in it. Science does not work that way, and efforts to

limit the science to its sponsoring nation turn out to weaken the science and harm the nation, as the closed economies have discovered.

Given internationally available knowledge, it greatly benefits each individual nation to create knowledge links to other countries of the world. These links help a country guard against isolationism and parochialism; they also open the society to broader economic, intellectual, technical, and social possibilities. A strong public case can be made for reducing any import or export constraints on the flow of new knowledge. Research universities are a country's best-equipped institution to facilitate this flow. They generate, import, and disseminate nonproprietary knowledge, making it available to all the institutions of society—government, commerce, media, military, and civil society organizations.

The international intellectual commons based on nonproprietary and nonexclusive research allows the world to address a number of widely recognized challenges, such as emergent diseases, invasive species, and climate fluctuations. It is not in the interest of any single nation to invest heavily in research that could address these problems, because then the other nations of the world would have a free ride. Knowledge about these global challenges is, then, an international public good. It is in the public interest of every nation that this knowledge be created, but it will not be created in the absence of public investment. A network of research universities and institutes is a mechanism to advance the required research agenda.

For a number of reasons, then, it is in the interest of each nation to enhance those features of its universities that are able to participate in globally significant R&D and international expert systems focused on global challenges. This plan works to the benefit of African universities in an environment in which they reposition themselves to advance national competitiveness in the international knowledge economy. Only by continuing to assert and reflect a public-good responsibility can they function as a link between their national economies and that part of the international system which continues to be nonproprietary.

To summarize: The trends earlier noted—neo-liberal economic doctrine and the prospect of substantial emigration driven by economic considerations—are and will continue to influence African tertiary education in a manner that pulls it closer to market-derived accountability. This pattern threatens to weaken the traditionally close association of university education to a set of public-good responsibilities.

The international donor community can provide a corrective. Being largely outside the market, it is well positioned to protect the public interest dimension. In particular, it can support Africa's connection to the global economy by

helping African universities to assert a new, internationally defined role constructed around the linked values of advanced education and nonproprietary research.

Notes

1 An estimate of 662 for-profit institutions awarding degrees appears in *Change* (2000). *The Chronicle of Higher Education* tracks the market performance of 11 publicly traded higher-education companies.

2 This section was prepared without having had the benefit of Ndulu's paper, presented at the same conference and also published in this issue, in which an extensive, well-documented analysis confirms and advances the views expressed here.

3 Ndulu (this issue) reports that Africa has already lost 30% of its highly skilled personnel to OECD countries.

4 The following discussion benefited in major ways from Coleman and Court (1993).

5 This section reflects and repeats arguments advanced by the Task Force on Higher Education in Developing Countries, co-chaired by Mamphela Ramphele and Henry Rosovsky and on which I served as vice-chair.

6 Compare, for example, the mission statement of Harvard University with that of the for-profit University of Phoenix. Harvard "encourages students to respect ideas and their free expression, and to rejoice in the discovery and in critical thought; to pursue excellence in a spirit of productive cooperation. . . "The University of Phoenix "provides general education and professional programs that prepare students to articulate and advance their personal and professional goals."

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Human Capital Flight: Stratification, Globalization, and the Challenges to Tertiary Education in Africa[1]

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Abstract

Development efforts in Africa are greatly hampered by the flight of both financial capital and by human capital (brain drain). Even those professionals who remain frequently engage in less-skilled occupations because of weak national economies. The historic "push" factors of economic and demographic pressures are currently intensified by globalization, movement toward a knowledge-based economy, and global demographic trends. Given that a continuation of fast-paced loss of the region's talent is likely to continue for some time, the author urges the adoption of strategies to enhance the capacity of African nations for training, retaining skilled manpower, and reversing some brain drain. Tertiary education institutions are evolving to fill the quantity and quality deficiencies in the region, including the emergence of global education, new global knowledge-sharing mechanisms, information technology, networking, and parallel systems such as independent certification and knowledge intermediaries. The article concludes with several recommendations for squarely addressing the underlying push factors toward emigration.

Résumé

Les efforts de développement en Afrique sont considérablement entravés par la fuite du capital financier et humain (fuite des cerveaux). Ceci touche même les professionnels impliqués dans des activités moins qualifiées, à cause de la faiblesse des économies nationales. Les facteurs historiques en cause, notamment les pressions économiques et démographiques sont actuellement intensifiés par la mondialisation, les mouvements vers une économie basée sur

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la connaissance, et par les tendances démographiques. Étant donné qu'il est fort possible que cette fuite rapide de talents régionaux se poursuive, l'auteur préconise l'adoption de stratégies destinées à améliorer la capacité des nations africaines, afin qu'elles puissent former, retenir la main-d'œuvre qualifiée et renverser cette tendance. Les institutions de l'éducation tertiaire sont en train de changer, pour pouvoir combler les déficits qualitatifs et quantitatifs de la région, ce qui implique l'émergence d'un enseignement, de nouveaux mécanismes globaux de partage de la connaissance, la technologie de l'information, la constitution de réseaux, et les systèmes parallèles, tels que les intermédiaires indépendants pour la certification et la connaissance. L'auteur termine en fournissant diverses recommandations destinées à faire face aux facteurs responsables de l'émigration.

Introduction: Why the Concern with Human Capital Flight from Africa?

A recent remark by the Geneva-based International Organization for Migration (IOM) captioned "African brain drain robs continent of future" captures the sentiment on the human capital outflow from the region. The remark asserts that the brain drain of highly skilled professionals from Africa to overseas opportunities is making economic growth and poverty alleviation an almost impossible task across the continent. Recent meetings of the Heads of State of the Southern African Development Community (SADC) and the meeting of the Association of African Central Banks (AACB) (August 2001) echoed similar sentiments.

Africa is a capital-scarce region, and the loss of this limited resource is widely considered to be detrimental to the prospects of sustained growth and development. The concerns about loss of African capital have to date largely focused on the flight of financial wealth from the region. Investment in Africa remains low, even by developing countries' standards, at the same time that private capital, estimated at nearly 40% of Africa's wealth, has left the continent in search of safer havens. Independent estimates show that, in 1990, Africans held up to $360 billion or 40% of their wealth outside the region. This was equivalent to the size of Africa's debt or 90% of GDP. This high capital flight compares unfavorably with just 6% of East Asian wealth and 10% of Latin American wealth being held outside of their respective regions (Collier, Hoeffler & Patillo 1999). Many of the factors that inhibit capital inflows also motivate capital flight from Africa. Human capital flight parallels this problem of financial capital flight.

Low levels of human capital, particularly skill deficiency, is a drag on investment and growth in Africa. Progress in overcoming shortages of skilled and trained manpower seems to be disappointingly slow, despite substantial resources devoted by both governments and donors to this effort during the last three decades (OED 1994). This deficiency is sustained at the same time that Africa is losing a very significant proportion of its skilled and professional manpower to other markets and is increasingly dependent on expatriates for many vital functions.

The problem of human capital in Africa is not solely due to low levels of education and training. The region has been unable to retain a large proportion of its skilled and professional personnel, an issue on which this paper will focus. To obtain a correct sense of proportion of the problem at hand, it is useful to place this component of African migration in the context of overall world migration. Approximately 150 million people, or 4% of the total world population, is composed of migrants. The International Organization for Migration (IOM) (2000) estimates that 50 million or one third of all world migrants are African. It is noteworthy that most African migration is intra-continental and that about half of the African migrants are either refugees (5 million) or displaced persons (20 million). My focus in this paper therefore concerns a very small proportion of migrants from the region—that is, skilled and professional Africans who emigrate to the rest of the world.

African international migration has grown faster than that from any other region in the last three decades, raising its share in the global total from 10.6% in 1965 to 13.4% in 1990 (Zeleza 1998). This rate exceeds Africa's share in the world population, which is approximately 10%. The estimated average number of skilled African emigrants rose from 1,800 per year between 1960 and 1975 to 23,000 between 1974 and 1987. (See Table 1.) Although Africa is comparatively the smallest source of immigration to the developed world, a high proportion of its migrants consists of highly skilled professionals. Emigration from Africa is therefore uncharacteristically skill intensive.

Table 1: Estimates of Brain Drain from Sub-Saharan Africa

Period	Total Emigration of Highly Skilled from Africa	Average Per Year
1960–1975	27,000	1,800
1975–1984	40,000	4,400
1974–1987	70,000	23,000
1986–1990	50,000–60,000 middle- and high-level managers emigrated from the continent.	
1960–1987	100,000 trained and qualified Africans abroad, 30% of its highly skilled manpower.	
1960s	More than half of the Africans who went overseas to study physics and chemistry never went back home.	

Source: Haque and Aziz (1998)

Although much of the evidence is sporadic and anecdotal, one can nevertheless obtain a good sense of the magnitude of the problem. It has been estimated that, for a number of African countries, more than 30% of its highly skilled professionals are lost to the OECD countries (Carrington & Detragiache 1998; Haque & Aziz 1998). Nearly 88% of adults who emigrate from Africa to the United States have a high school education or higher (Speer, cited by Zeleza, 1998). Apraku (1991) conducted a survey of African immigrants in the United States, finding that 58% of the respondents held either Ph.D. or had M.D. degrees and that a further 19% had master's degrees. Of these, 20% had previously been university professors in their home countries. This figure compares with 40% for all immigrants to the United States who had completed some form of tertiary education. (See Table 2.) A more systematic analysis of the 1990 U.S. Census shows that, out of 128,000 African immigrants over age 25, 95,000 were highly educated. More African scientists and engineers are working in the United States than there are in Africa. The emigration of technically skilled people has left only 20,000 scientists and engineers in Africa to provide services to 600 million people (IOM 2000).

Table 2: Foreign and National Adult Populations Classified by Level of Education in Selected OECD Countries, 1995–1998 Averages, in Percentages

Country	Lower Secondary		Upper Secondary		Third Level (Tertiary)	
	Foreigners	Nationals	Foreigners	Nationals	Foreigner	Nationals
USA	35.0	15.7	24.1	35.0	40.9	49.3
Germany	48.5	13.2	37.0	62.2	14.4	24.6
France	63.3	33.4	22.9	45.4	13.8	21.1
Italy	47.1	56.3	38.3	34.3	14.6	9.3
U.K.	65.1	43.9	14.7	32.5	20.2	23.7
Canada	22.2	23.1	54.9	60.3	22.9	16.6
Sweden	30.8	20.4	41.5	50.3	27.3	29.3

Source: Compiled from OECD, *Trends in International Migration* (various issues)

Regional averages mask the wide variation of the problem faced by individual countries. Table 3 shows the proportion of migrants from a sample of 24 African countries. The range across these countries varies from 44 to 90% of emigrants who have tertiary education. Anecdotal information, impressively compiled in the paper by Paul Zeleza (1998) and in the 1992 *Human Development Report* of the U.N. Development Program (UNDP), provides the flavor of variation across countries. It is estimated that more than 21,000 Nigerian doctors are practicing in the United States. About 60% of all locally trained Ghanaian doctors left the country in the 1980s. (UNDP 1992). In Sudan, 17% of doctors and dentists, 20% of university lecturers, 30% of engineers, and 45% of surveyors have gone to work abroad. South Africa has lost 25% of its graduates to the United States alone. Moreover, South Africans account for 9.7% of all international medical graduates practicing in Canada. Out of all the medical graduates produced by the University of Witwatersrand in the last 35 years, more than 45% (or 2,000 physicians), have left the country. South Africa's Bureau of Statistics estimates that between 1 million and 1.6 million people in skilled, professional, and managerial occupations have emigrated since 1994 and that, for every emigrant, 10 unskilled people lose their jobs. Gambia has lost almost 60% of its graduates to destinations abroad. In the 1980s, Zambia had 1,600 doctors in the country. The number has since plummeted to 400. The Human Resources Division of the Southern African Development Community estimates that at least 10,000 teachers have left SADC countries for greener pastures since 1996 (Integrated Regional 2001).

Table 3: Migration to the USA by Educational Attainment for Selected African Countries, 1990

Country of Origin	Schooling Level				Secondary Plus Tertiary	Secondary Plus Tertiary as a percent of Total	Tertiary as Percentage of Total
	Total	Primary	Secondary or Less	Tertiary			
Algeria	3904	60	1280	2564	3844	98	65.68
Benin	180	20	80	80	160	89	44.44
Cameroon	1694	60	200	1434	1634	96	84.65
Central African Republic	160	0	60	100	160	100	62.50
Congo	200	0	20	180	200	100	90.00
Egypt	53261	980	13020	39261	52281	98	73.71
Gambia	747	100	120	527	647	87	70.55
Ghana	12544	40	3400	9104	12504	100	72.58
Kenya	8372	40	1420	6912	8332	100	82.56
Lesotho	160	0	20	140	160	100	87.50
Malawi	381	0	120	261	381	100	68.50
Mali	220	0	100	120	220	100	54.55
Mauritius	1100	0	260	840	1100	100	76.36
Mozambique	920	80	280	560	840	91	60.87
Rwanda	200	0	20	180	200	100	90.00
Senegal	1370	180	420	770	1190	87	56.20
Sierra Leone	4155	80	1060	3015	4075	98	72.56

Table 3:Continued

Country of Origin	Schooling Level				Secondary Plus Tertiary	Secondary Plus Tertiary as a perent of Total	Tertiary as Percentage of Total
	Total	Primary	Secondary or Less	Tertiary			
South Africa	22678	200	4980	17498	22478	99	77.16
Sudan	2496	0	760	1736	2496	100	69.55
Togo	460	20	140	300	440	96	65.22
Tunisia	2816	60	1120	1636	2756	98	58.10
Uganda	5060	120	1000	3940	4940	98	77.87
Zambia	1613	0	340	1273	1613	100	78.92
Zimbabwe	3161	20	420	2721	3141	99	86.08
Total/Average	127852	2060	30640	95152	125792	98%	74.42%

Source: Carrington & Detragiache (1998), Table 1.

The problem also manifests itself in terms of those training abroad who do not return to the region. Pires, Kassimir, and Brhane (1999) conducted a survey on the rate of repatriation of 1,708 sub-Saharan African Ph.D. holders who were trained in a selected number of universities in the United States and Canada between 1986 and 1996. Their analysis indicates that 34% have not returned to Africa. (See Table 4.) Of African Ph.D. graduates in the United States over this period, 57% returned to their countries of origin, and 5% went to other African countries for a total return rate of 62%. Overall, 36% stayed in North America, and the remaining 2% went to Europe and elsewhere. Variations in rates of repatriation across countries were conditioned by a number of factors, including political instability, lack of job opportunities, weak or absent universities and independent research centers at home, and fear of professional atrophy.

Table 4: Return Status by Country of African Ph.D. Recipients in North America, 1986–1996

50% + Return Home	Return Rates (%)				
	Total PhDs	Home	Africa	In USA	Other
Benin	4	50		50	
Botswana	19	94	6		
Bukina Faso	25	79	13	8	
Burundi	14	57	43		
Cape Verde	2	100			
Chad		2	100		
Congo-Brazzaville	5	67	33		
Guinea	11	70	20	10	
Ivory Coast	42	59	4	37	
Kenya	155	65	5	28	2
Lesotho	12	90	10		
Madagascar	18	67	11	11	11
Malawi	39	81	8	11	
Mali	17	77		23	
Mauritania	7	50		25	25
Mozambique	6	80		20	
Namibia	2	100			
Níger	21	62		38	
Senegal	16	62		38	
South Africa	223	67		30	

Table 4: Continued

50% + Return Home		Return Rates (%)			
	Total PhDs	Home	Africa	In USA	Other
Swaziland	31	80	10	10	
Tanzania	58	79	2	19	
Togo	24	68	5	26	
Uganda	54	79	3	17	
Zambia	38	79	4	18	
Zimbabwe	51	83	7	10	
50% or Greater Stay		Return Rates (%)			
Angola	1	100			
Cameroon	62	33	5	60	3
Gambia	7	33	17	50	
Ghana	166	34	5	61	
Liberia	23	21	21	58	
Mauritius	8	40	60		
Nigeria	261	34	3	62	2
Sierra Leone	30	22	6	72	
Somalia	17	33	11	56	
Dispersed Location		Return Rates (%)			
Ethiopia	89	47	4	47	2
Rwanda	16	36	14	43	7
Sudan	92	48	5	35	11
Congo Dem. Rep	33	42	17	42	
Other		Return Rates (%)			
Guinea-Bissau	4				100

Source: Zeleza (1998)

Some cost estimates have been made on brain drain from Africa. Although they are unsystematic, they show that the main cost is the loss of investment in education. The U.N. High Commission for Refugees (2001) estimates that the educational capital embodied in highly skilled graduates who emigrated to the

United States in 1990 alone was $640 million. It concludes that emigration can represent a significant transfer of resources from poor countries to rich. The U.N. Commission on Trade and Development (UNCTAD), for its part, estimated the annual cash value of each African professional migrant, based on 1979 prices, at $184,000 (Oyowe, 1996). With an estimate of roughly 95,000 African professionals in the United States alone, this suggests that Africa is losing almost US$17.5 billion annually through brain drain, while receiving technical assistance of only about US$4 billion from all sources. These estimates do not necessarily represent the opportunity cost of the loss to African countries as it is not certain whether the skilled emigrants would have been gainfully engaged in their own professions at home. Furthermore, there are ample cases of internal brain drain, through which professionals engage in petty trade and other nonprofessional activities because they are unable to find sufficiently remunerative employment in their own line of work.

I began with highlighting the concern about human capital outflow from the region to set the stage for the rest of the paper, which will take up the issue from a developmental perspective. The paper is not about human capital flows in general. Rather it narrowly focuses on the high skill content of African emigration to industrial countries, its impact on development in the region, and the challenges faced by institutions of higher learning to help the region deal with this problem. Although tertiary education overall is rapidly expanding in Africa, higher education (accredited universities) is a shrinking proportion of it. African institutions of higher education address these challenges in two ways. One is by responding to the changing demand patterns for tertiary education at home; and the second is by adapting to emerging global arrangements for the production, utilization, and sharing of knowledge.

The rest of this paper deals with the issue of African brain drain in the context of relevant changes taking place internationally: globalization, movement toward a knowledge-based economy, and global demographic trends. The next section reviews the conceptual underpinnings of human capital flows from a developmental perspective, followed by a review of the evolution of tertiary education in Africa and its adaptation to the changing systems of knowledge generation and sharing in the global context. I then review possible actions for dealing with the impact of human capital flows, taking advantage of global knowledge sharing arrangements, and applying measures to reduce pressures for emigration. My conclusion is that control measures will not resolve these issues; instead it is necessary to squarely address the fundamental push factors.

Table 5: Scientists and Engineers Doing R&D in the United States (1993)

	Total		Education		Industry		Government	
	All Degree Levels	Ph.D.s	All Degree Levels	Ph.D.s	All Degree Levels	Ph.D.s	All Degree Levels	Ph.D.s
Total engaged in U.S. R&D	2,685,000	345,000	592,000	179,000	1,747,000	135,000	346,000	31,000
U.S.-born	2,254,000	244,000	470,000	128,000	1,477,000	90,000	307,000	26,000
Foreign-born	431,000	101,000	122,000	51,000	270,000	45,000	39,000	5,000
Location of S&E degree								
Foreign school	138,000	32,000	41,000	16,000	87,000	14,000	9,000	2,000
U.S. school*	293,000	70,000	81,000	35,000	183,000	31,000	29,000	4,000
Foreign-born in R&D as % of R&D total	16.1	29.3	20.7	28.5	15.5	33.2	11.2	17.3
U.S school as % of foreign-born in R&D	67.9	68.7	56.1	67.9	67.6	69.6	75.8	69.2

*Location of highest earned S&E degree.

Source: National Science Foundation, Division of Science Resources Studies, SESTAT database.

Human Capital Flows from a Developmental Perspective

Human capital is the stock of skills and productive knowledge embodied in people. Increasing yield or return to human capital investment involves enhancing a person's skills and earning power (private return) and in increasing overall economic efficiency through the complementary application of different skills and improved economic decision-making both within and outside of the market economy (developmental value). Adam Smith in *Wealth of Nations* identified the improvement of workers' skills as a fundamental source of economic progress and increasing human welfare (cited in Eatwell et al., 1996). These improvements are achieved not only through education and formal training but also through learning by doing. From an individual's perspective, investment in human capital is a lifelong process. Knowledge embodied in a person includes abilities for problem solving, command over relevant information, and technical, managerial, and entrepreneurial skills.

Human capital flow, although it is not recorded in the balance of payments among nations, entails an international transfer of resources in the form of human capabilities and skills. Although the flow of human capital has lagged behind that of commodities and financial capital, it has a significant effect on development as I will argue later. The pattern of human capital flows is changing as the source countries are diversifying; and skilled migration has assumed greater importance, both in terms of the actual population flows and in terms of the focus of migration policies more generally.

Human Capital Flows and Growth

From a developmental perspective, the main concerns about the outward flows of skilled people from Africa arise from the negative consequences on growth and income levels. This effect is in addition to the unaffordable loss of the considerable investment undertaken in generating these skills. The traditional position on this issue is that brain drain is a negative externality imposed on the population remaining behind, creating slower economic progress and living standards in poor countries (Bhagwati & Hamada 1974). Loss of jobs for semi- and unskilled workers and a reduction in production and incomes result from an inadequate supply of skilled and professional labor because it is a necessary complement to semi-skilled and unskilled labor in production (Miyagiwa 1991; Piketty 1997). Already poor source countries lose their potentially most enterprising and ambitious young population, stifling the development of a more dynamic private sector.

More recent research on growth has strengthened the traditional position by showing that brain drain from a skill-scarce poor country leads to a permanent loss in growth and income levels (Haque & Aziz 1998; Haque & Khan

1997). Brain drain reduces the growth rate of the effective human capital that remains behind in the economy and hence generates a permanent reduction in per capita income growth in the home country (Haque & Kim 1995). The findings build on results from research on endogenous growth and its extensions. Unlike the neoclassical growth literature in which long-run growth is determined by exogeneous rates of population increase and technological progress, the endogeneous growth literature suggests that the long-run rate of income growth is also influenced by public policies and public investment which in turn influence the rate of technological progress and productivity growth. The accumulation of human capital is an important part of this long-term development process and is influenced in important ways by public programs.

Although basic education is widely considered to be critical for poverty reduction, there is emerging evidence from cross-country growth studies that secondary and higher education are more significant in raising long-term growth rates and income levels (Barro 1998; Barro & Jong-Wha 1993).[3] In a recent paper, Barro (1998: 18) finds that school attainment at the secondary and higher levels for males aged 25 and over has a positive effect on the subsequent rate of economic growth.[4] The estimated impact for this category is such that an additional year of schooling raises the growth rate impact by 0.7% per year, a very large effect indeed for slow growers (Barro, 1998: 18). This impact is mediated predominantly through improved capabilities to absorb technological advances. Based on cross-country scores in international examinations, Hanushek and Kim (1995), emphasize that quality of schooling capital is more important for economic growth than years of educational attainment.

In a cross-country empirical study to determine the effect of foreign direct investment (FDI) on growth, Borensztein, DeGregorio, and Lee (1998) tested the effect of the flow of FDI from industrial countries to 69 developing countries. They found that FDI had a larger impact on growth than domestic investment, due to its higher productivity; however, this impact appears only when there is sufficient capability in the host country to absorb the complex technologies that come with FDI. The robust complementary effect between FDI and human capital results when the host country has reached a minimum threshold stock of human capital, namely, that men 25 years and over have at least 0.52 years of secondary schooling. This level of educational achievement is far above that of the majority of African countries.

The skills lost through brain drain are not easily replaced given the limited capacity of higher education and training capacity in developing countries and the paucity of the means for acquiring these elements elsewhere. In a dynamic sense, brain drain can reinforce the limited ability to generate needed skills in poorer countries as it reduces their capacity to train a new generation of pro-

fessionals (UNDP 1992). But as I will argue below, with globalization, the borders for the reproductive capacities of knowledge are softening.

The use of technical assistance through aid to fill capacity deficiencies in poor countries has often targeted short-term alleviation of capacity shortfalls. In this form, it often discouraged efforts to build and retain local capacity in government. Enclave project or program management systems, usually deployed with technical assistance to address capacity weaknesses in the public sector, have tended to engender psychological dependence on expatriate capabilities. This dependence has very often militated against capacity development for sustained self-management in these countries.

Recently, a strand of research on brain drain points to indirect beneficial effects from allowing migration. These effects arise from the fact that migration possibilities foster relatively higher investment in education, because of higher expected returns abroad to education (Beine, Docquier & Rapoport 1997).[5] It is argued that as long as this "brain gain" effect from migration possibilities dominates the ex post effect of actual out-migration, the average level of human capital of the remaining population would be higher. The empirical work of this strand confirms a strong positive effect of migration possibilities on human capital investment and that, for moderate levels of actual ex post migration, the net effect could indeed be beneficial. It is important to emphasize that the beneficial effect requires that ex post out-migration not be excessively high, a point that the traditionalists emphasize.

Main Causes of Voluntary Human Capital Flows

Economic and Demographic Pressures

The causes of "voluntary" emigration of professional skills are multifaceted and so are the theories explaining them. In this section, I first review the conceptual basis for pressures behind emigration and then draw lessons for the African situation from empirical work by Hatton and Williamson (2000) about the experience of 19th century European emigration.

Neoclassical micro theory of migration flows has tended to emphasize differentials between source and destination countries in the rates of return to investment in human capital (mainly a result of productivity differences) and employment rates (the underdeveloped private sector and an inefficient public sector, which limit opportunities for reasonable returns in Africa). The new economics of migration explains the flow primarily as a household strategy to mitigate risk in household income earning, which in turn is a consequence of missing insurance markets and a lack of compensatory income distribution policies in source countries. Official global remittances in 1990 were estimated

at $71 billion and represented a net transfer back to developing countries of $31 billion, equivalent to nearly three quarters of Overseas Development Assistance (ODA) (Russell 1998). The risk of professional marginalization and obsolescence reinforces these pressures, stemming from professional isolation, the absence of peer pressure and interaction, and the absence of complementary inputs for professional practice.

Dual labor market theory is demand based and underscores the drive by employers and governments in destination countries to source low-wage migrant workers as a way of avoiding structural inflation. Political instability and civil strife are the main reasons for refugee migration, reinforcing the push factors for migration. Hatton and Williamson (2000) analyze the driving forces behind mass migrations from poor countries in Europe in the late 19th century to draw lessons about the potential of future emigration from Africa to more developed economies. Their analysis indicates that economic and demographic fundamentals are the key drivers, and they conclude that these forces lead to projections of emigration from Africa of a far greater magnitude than was the case from 19th century Europe.

In the European experience, these forces worked themselves through three key channels. First, the real wage advantage of destination over source countries raised emigration by 1.27 per thousand. Second, demographic pressures (and transition) drove emigration with a long-term estimate suggesting that half of excess births in source countries compared to destination countries ended up emigrating 20 years later. This impact was dominated by the changing share of population (or work force) aged 15–29, which is the group most likely to move. Third, the stock of migrants and the past migration rate had a chain effect on the current emigration rate, leading to persistence in emigration streams. For example, nearly a third of African immigrants arriving in the USA during the late 1990s were classified as close relatives of U.S. citizens. A combination of these factors over the long term propelled an inverted U-pattern of emigration. First, it rose as the youthfulness of the demographic structure and increasing real wages at home made the cost of emigration more affordable. After it peaked, it then declined in the catch-up phase as the real wage differential closed and the population structure became more mature.

Hatton and Williamson (2000) also assess the relevance of the European experience for potential African emigration. The real wage gap between Africa and developed countries is enormous and is unlikely to shrink in the near future given the slow growth of the region. The huge incentive to emigrate from the region will therefore persist for the foreseeable future. Although Africa is unlikely to catch up with destination countries in the near future, it will continue to experience some improvement in real wages and standards of living,

thus making the cost of emigration more affordable. The proportion of youth in the total population is rising fast, even after adjusting for the impacts of AIDS. This category of the population is projected to grow at 2.9% per annum between 1995 and 2025 for Africa as a whole. This rate increases to 3.4% if one excludes North Africa (Hatton & Williamson 2000).

The demographic pressure from an explosive increase of the economically active population in the developing countries is exacerbated by nonreplacement population growth in key migration destinations.[6] Replacement migration strategies are likely to attract international migration to offset declines of total and particularly aging populations in developed countries. In his paper published in this issue, Kenneth Prewitt observes that the USA is already adjusting its immigration policy in that direction and that Europe may not be able to withstand the pressure from population decline and dislocation of economic activity without following suit. As already noted, international migration has increasingly tended to favor skilled migrants. Thus, there is likely to be mounting pressure for the emigration of young skilled persons from poor developing countries to developed ones.

Globalization, the Knowledge-based Economy, and the Intensification of Human Capital Flows

The world systems theory explains voluntary international migration largely through the process of globalization of production and trade. Such flows are facilitated by a significant reduction in barriers to trade, production sharing arrangements, and the reduced cost of movement. Globalization offers opportunities for the amelioration of the pace of brain drain and creates sources of additional pressures for emigration of skilled manpower from poor developing countries.

Globalization has enhanced the mobility of all forms of capital, accelerated the standardization of knowledge and increased production by multinationals, and increased the scope for private sector growth. The phenomenal growth and easier mobility of private capital opens up opportunities for engaging professionals in their home countries and providing higher returns based on increased productivity. This is by no means trivial, particularly for countries in Africa, where most professionals have been engaged in the public sector at typically very low wages.[7] Global knowledge-sharing arrangements, through partnerships and networking, are also expanding the scope and capacity available to poor countries for production and more effective application of knowledge.

The global production system creates production-sharing arrangements across countries by multinationals. Such arrangements currently account for over 30% of global production (Lindbaek 1997). Although such arrangements

are still predominantly found in industrial countries, developing countries are increasingly participating in them, based on their low-wage comparative advantage, and thus raising opportunities to use skilled local workers. The comparative advantage of low wages in developing countries, however, can be nullified by low productivity, in part due to the scarcity of complementary professional skills. Although wages per hour may be low, wages per unit of output could be high due to low productivity. Surveys of investors show that labor is not cheap where productivity is low. Productivity, in turn, is influenced not only by the quantity and quality of capital stock, but also by the quality and quantity of knowledge. (Lindbaek 1997).

The emergence of a knowledge economy opens new windows of opportunities for latecomers to achieve faster productivity-based growth. This is partly because new technologies allow "leap frogging" for those countries that are not hampered by inertia from the previous industrial structure (Perez 1985). It has been shown that, as major technological revolutions take place, developing countries that have positioned themselves to benefit from the "underlying technology" of the next long wave can catch up with rich countries, while those who lock themselves into dinosaur technologies fall behind (Brundenius 1996). The challenge to developing countries, however, relates to the fact that two key elements of the knowledge economy, information and micro-electronics, aid human mental effort. To meet this challenge, poor countries have to position themselves within this technological revolution. Opportunities for "leap frogging" and threats of marginalization are strong motivators for seeking and retaining knowledge.

The Evolving African Knowledge System in the Global Context and the Brain Drain Challenge

We start with the premise that Africa will continue to experience emigration of skilled and professional personnel to the developed world for the foreseeable future. Based on pressures from globalization and demographic trends in the sending and receiving countries reviewed above, I foresee a continuation of fast-paced loss of the region's talent for some time to come. For the long term, Africa needs to devise strategies to enhance its capacity for training, retaining skilled manpower, and reversing some brain drain. In this section, I examine how tertiary education institutions are evolving to fill the quantity and quality deficiencies in the region. This assessment takes into account the global evolution of the education system and new opportunities from global knowledge-sharing mechanisms facilitated by developments in information technology and networking. I also look at the emergence of systems to generate and share outside of the tertiary education system.

Tertiary Education in Africa

The tertiary education system is hard pressed to keep pace with increasing and diverse local demands for knowledge, in addition to coping with the consequences of the brain drain from the region. While other supply-side solutions are emerging, such as the global knowledge-sharing arrangements and networking discussed below, the African tertiary education system will have to carry the bulk of the burden.

Africa, like the rest of the world, is currently undergoing a major transition from the traditional university-based higher education to a more utilitarian and diverse tertiary education system. The influence and pressure from the evolution of the global education system, treated in some detail by Kenneth Prewitt (2001) is evident here. Multi-faceted delivery systems for higher education are emerging to challenge the traditional monolithic system dominated by universities. This same development is slowly occurring in Africa as well, vindicated by the emergence of a range of specialist higher education institutions and centers performing tasks once considered the preserve of the "do-it-all" universities.

The evolution is marked by a proliferation of professional schools, industry-specific training institutes (for example, for banking and other sector-specific units offering on-the-job training), and private universities with program structures tilted toward professional courses. This development is amplified by the emergence of more cost-effective delivery systems, such as correspondence education, part-time higher education programs such as open universities, and multiple streaming of programs to accommodate part-time students in conventional universities. Electronic communication is creating "virtual universities" with no national or regional boundaries. At this point, there is an apparent incoherence and some degree of waste in the evolving system, reflecting the process of transition and the desperate quest for institutional survival.

These important developments prompt or support the ongoing changes in the organization and delivery of tertiary education in Africa.

The Utilitarian Nature of Tertiary Education

Tertiary education in Africa, including higher education, is becoming much more utilitarian, a development occurring in tandem with the rising dominance of market-oriented approaches to organizing and providing education services worldwide. The effectiveness of the education system is assessed on the grounds of its ability to provide relevant and effective skills for dealing with specific tasks. This change places far greater pressures on the higher education system to be responsive to the perceived needs of the society which it seeks to serve.

The rapid change is prompted by increasingly more exacting demands regarding "returns to investment" in education from both the private and public service sectors. From the private cost-benefit perspective, those committing resources in education or knowledge investment assess income earning capabilities and mobility across employment in local and international firms. The ability of tertiary education institutions to provide relevant and effective skills for dealing with specific tasks is a major criterion by which particular modalities of delivery of tertiary education are judged.

From the social cost-benefit view, functionality and more recently, meritocracy are increasingly determining the way tertiary education is assessed by those in the public sector. This perspective is based on the growing view that improved governance through, *inter alia,* deployment of better human capital in the public sector will strengthen the capacity for improved economic management and public service delivery. Most second-generation public service reform programs in Africa aim to achieve this goal. Professionals and those with technical skills are necessary for the development of civil society. They serve as watchdogs of prudent public policy and the application of good governance (Haque & Aziz 1998). Deployment of better human capital in public service and the domestic presence of professionally competent civil society as agents of restraint engender improved governance and can induce increased private investment and higher productivity of the private sector.

Within the public sector, rewards to higher education may be based on the relevance and effectiveness of the knowledge gained in the process of education. Governments as major employers typically apply this distinction across disciplines in setting pay scales and professional progression. After nearly three decades of wage compression for egalitarian reasons, governments in reforming countries are decompressing wages and salaries, increasing differences in pay across skill levels. The private sector is even more discriminating in these terms. Within the system of higher education itself, secondary sources of earnings among staff are largely determined by the differences in the marketability of their skills and disciplines to clients.

Independent Certification

There is a growing influence of independent quality certification of the products of tertiary education in Africa. Independent certification reduces the risks faced by employers who must otherwise engage graduates of unknown quality. It thus helps to deal with the problem of information asymmetry between producers and users of products from the growing number and wide variety of tertiary education institutions. Independent certification is the primary instrument of accountability for the sector. Professional associations and registration

boards for practicing professionals play a central role in ensuring adherence to standards and minimum requirements for professional certification. These institutions cover most professional studies, including engineers, medical practitioners, lawyers, and accountants. Increasingly some graduates also seek international standard certification by enrolling for similar examinations abroad to expand their opportunities for employment in international firms at home and abroad.

The accountability system is considerably weaker for most of the "nonprofessional" products, including the liberal arts, social sciences, and pure sciences. Nevertheless, two types of arrangements are being used to certify these categories of higher education. One approach is through collaboration with reputable institutions abroad through twinning arrangements. This approach has entailed issuing certificates to local students from the more reputable partner institution abroad. The second approach is through regional or subregional collaborative graduate programs, such as the one supported by the African Economic Research Consortium (AERC) or CIEREA. This approach utilizes a collective quality assurance mechanism applied through (a) peer pressure for adherence to commonly agreed high-quality curriculum, (b) selectivity in designating certifying institutions from among the collaborating institutions based on adequacy of capacity to offer core courses of agreed quality, and (c) subjecting student and program performance to external international review. Both programs run a joint facility for electives. In addition to pooling quality staff and expanding the menu of specializations, the facilities also indirectly act as a quality controllers for core courses offered by the designated universities.

Knowledge Intermediaries

The presence and role of knowledge intermediaries between producers and users of knowledge outside the formal tertiary education system are increasing. These intermediaries raise the demand for knowledge in the public policy sphere. There is no doubt that most African countries urgently need to strengthen their policy-making resources. Outside of government, capacity for policy analysis resides in universities, academically oriented research institutes, and more recently, national policy institutes. A 1994 study conducted by AERC in eight sub-Saharan African countries found that most communities, parliaments, and nongovernmental organizations did not possess their own in-house capacity for policy analysis, relying instead on the institutions mentioned above.

A more worrying finding from the study, perhaps, is the fact that research and analysis performed in academic institutions is rarely available to either government or nongovernment users due to poor dissemination. Until very recently, no intermediate institutions, such as national policy institutes, existed

to make complex analyses available in formats intelligible to a variety of audiences. However, the study did find that the barriers between the two groups are coming down in many of the countries studied, as researchers have gained credibility by producing more policy-oriented research and presenting their recommendations in practical formats. Policy institutes and policy research networks have recently launched a wide range of initiatives to meet these challenges. All these initiatives aim to augment the pool of analysts, enhance skills and professionalism, and promote the application of research in the policy context (Ndulu 1996).

During the past five years, national policy institutes have emerged, funded by regional and international donors, governments, the private sector, and by their own resources from specific consulting or fee-based tasks requested by their wide clientele. As knowledge intermediaries at the local level, national policy institutes play a particularly useful function in enhancing access to global and local knowledge. At the same time, they provide feedback to shape the agenda of knowledge producers. The better institutes have built strong credibility with both sides—suppliers and users of knowledge—and serve as honest brokers in dialogues involving competing interest groups. The institutes also respond to requests for policy analysis by mobilizing local talent to carry out necessary research. In many cases, these institutes operate knowledge-access systems including Websites for users and researchers. By maintaining a forward-looking research agenda, national policy institutes seek to proactively influence the policy agenda.

Intermediation efforts are not confined to national levels. Regional or subregional policy research networks are also emerging across several disciplines and specializations. These are networks of individuals and institutions across countries. The most prominent example is a network of economists engaged in policy-oriented macroeconomic research, coordinated and supported by the AERC. Other examples include the East Africa Environmental Economics Network, the Council for Development of Social Science Research in Africa, and a francophone network dealing with industrial policy. Policy seminars organized by these networks can bridge the gap of suspicion between academics and policy makers. Not only do they provide a showcase for local talent in policy analysis, but they also foster important dialogue on policy issues. Joint initiatives between public and private researchers have also proved to be an effective way of cultivating close relations.

Making Use of Global Knowledge Sharing

Arrangements to Supplement Local Capacity

Globalization is softening the boundaries of learning, knowledge-generation and knowledge-application, widening the scope for ameliorating the impact of brain drain, and strengthening local capacity. Indeed, national or regional boundaries for knowledge generation and knowledge application are increasingly becoming superfluous as a basis for assessing an individual country's capacity for education and training. Information technology has opened up the scope for accessing and exchanging global knowledge and for distance learning. Virtual tertiary institutions, networking among higher education institutions and professional associations, international certification, and standardization of achievements are some of the major vehicles which integrate the global knowledge system across countries.

There is a growing consensus in the international development community that knowledge sharing is a global public good. Globalization has made the prosperity and welfare of the world much more interdependent, with stronger channels for contagion effects (good or bad). It is also widely recognized that poverty is the weakest link in the concerted efforts by the international development community to make the world safer, healthier, and more prosperous. Development based on knowledge can indeed make a difference in the pace and extent of improvement in livelihoods and the quality of life of the people in the developing world. Countries and people differ in their capacity for acquiring, absorbing, and using knowledge. Evidence suggests that these knowledge gaps—the distribution of knowledge between rich and poor countries and within countries between rich and poor people—are widening. Knowledge sharing is, therefore, one effective way for closing knowledge gaps in the context of global interdependence.

There is some scope for global exchange of knowledge, for mutual benefit even among unequals, by linking locally specific and global knowledge. There is also a growing appreciation for location-specific knowledge in a rapidly evolving global knowledge system. This is clear from the recent prominence of learning from country or region-specific situations whether in the forms of "miracles" or "crises." The world thus continuously learns from "best practices," "disasters," and "exceptions to received wisdom" to augment the knowledge base. For this to happen, effective international mechanisms for knowledge exchange and global learning need to be in place. Such mechanisms should also ensure relevance from contextual research and excellence through global peer pressure and through access to the international frontier of knowledge.

For poorer countries to effectively engage in this form of exchange, it is necessary to develop local capacities for knowledge generation and absorption. The tertiary education system is one important conduit for such exchange, but not the only one. Intermediaries for global knowledge are emerging in Africa outside the formal tertiary education system. Prominent among these include national research institutes, regional networks, and centers of excellence. As a group, these institutions play a facilitative role in availing global knowledge to African societies more broadly. They also help enhance the interaction between the tertiary education institutions and the global knowledge system. Albeit at a very early stage, African countries have also begun to exploit opportunities offered through global knowledge sharing arrangements as a means of supplementing and strengthening their capacity to deliver tertiary education, knowledge acquisition, and application.

Even as national higher education institutions reverse their previous state of decay, regional networks will continue to play a desirable and effective role in supporting and sustaining national knowledge generation and absorption in five important ways.

- Regional networks will continue to provide a critical mass of professional peer review not available at the national level, thus sustaining peer pressure for learning and excellence as well as alleviating professional isolation.
- Regional networks provide an effective mechanism for keeping in touch with the rapidly changing frontier of knowledge through contact with the rest of the world and information sharing.
- Networks provide a medium of exchange of experiences in a comparative mode and a mechanism for gleaning best practices from specific policy contexts thus making them an important resource for collective knowledge.
- Networks provide a cost-effective means for specialized training and skill formation often not viable at the national level, given the paucity of resources and time availability of specialist trainers.
- Networks constitute an effective approach to projecting a professional image through pooling to gain attention and profile. The collective ability of participants to garner recognition enhances professional credibility, thereby attracting additional opportunities for professional engagements and providing credible inputs from Africa into global learning systems.

Addressing Human Capital Flight from Africa

The strategies for addressing the consequences of the large emigration of skilled manpower from Africa should include both the demand-side and supply-side weaknesses. In the long term, higher and sustained growth holds the answer. To recap, the region is losing its talent because it cannot remunerate, preserve, and utilize it effectively. Low productivity in the economy and sluggish growth in employment opportunities explain the low rates of return to education. In the absence of a vibrant private sector to absorb the talent in African economies, demand for it will remain low and rates of returns in the local market are likely to stagnate at the current low levels. Political risks and civil unrest are factors militating against the retention of those trained locally or the repatriation of those trained abroad. The fact that the largest loss of skilled manpower occurs from troubled countries attests to this fact. To preserve and sustain acquired knowledge requires maintaining contact with peers and having access to tools necessary for its effective application. The paucity of both generates exit pressures.

African countries cannot contain the problem of brain drain by erecting hurdles to contain emigration. As we have learned in the case of financial capital, the region could not arrest the flight of its financial wealth through similar means. Success in reversing capital flight has begun in those countries that have created a conducive investment climate and expanded the scope of opportunities for investment. An appropriate strategy to contain human capital flight and, in some cases, achieve reversal would require addressing the push factors identified above and scaling up local demand for skilled manpower. There is an additional dimension of the strategy which we highlight below, the use of African talent in the diaspora to support development initiatives in the region.

While individual countries may take measures to reverse human capital flight, a collective initiative that includes easier labor mobility within the region would likely broaden the scope for retention of skilled personnel within Africa. With expanding growth opportunities at home and easier interaction with peers through professional networks, such efforts could be even more successful.

Raising Demand for Knowledge at Home

Private Sector Growth and Development

Talent will flee from locales in which it finds no gainful use. Raising the demand for skilled manpower in the region is part of any lasting solution to the brain drain problem. In a virtuous circle, better skills lead to higher growth;

and in turn, higher growth leads to increased demand for skills. There is no doubt about the need for skilled labor to spur growth and development, but this need must be backed by effective demand for it. The two main sources for expanding opportunities for gainful application of skills are private sector growth and professionalization of the public sector. As pointed out earlier, the ongoing transition toward a market-oriented economy led by the private sector augurs well for shifting the incentive structure in favor of scarce talent.

FDI can play an important role in raising productivity and returns to investment in education. FDI by multinational corporations is a major source of access to advanced technology by developing countries. It increases the rate of technical progress in the host country through a "contagion" effect from the more advanced technology and management practices used by foreign firms (Findlay, 1978). The complementarity between FDI and human capital in the process of productivity growth and technical progress provides the link to increased demand for skilled manpower. If African countries exploit the opportunities from the phenomenal growth in global FDZ, as they have been exploited in the other developing regions, the likelihood of retaining and reversing the drain of talent will be higher.

At 29%, the risk-unadjusted return to investment in Africa was estimated to be the highest among all regions of the world in 1999 (UN CTAD 1999). Yet Africa attracted only a miniscule share of the vast private capital flows. Higher risks, particularly for much-needed private investment in infrastructure, and low utilization of risk-mitigation instruments, such as investment guarantees, pose serious impediments to investment growth (Ndulu 2001). The most critical factors limiting investment include political risk of confiscation and expropriation, inability to transfer mobile assets or proceeds out, risk of contract repudiation, and asset losses due to episodes of political violence.

The success of African countries in attracting larger and more diversified foreign private capital depends also on the collective reputation of the continent and its ability to enlarge the market through enhanced connectivity. Spillover or contagion effects from wars, civil instability, and poor investment environments (policy, institutions, and regulations) dent the overall reputation. Individual countries cannot choose their neighbors, making it both imperative and urgent to reduce the perception of high investor risk in the region. Such improvements need to occur in a significant number of African countries to counter the legacy of negative perceptions regarding Africa.

Professionalizing the Public Sector

Globalization, the rising importance of information technology for enhancing productivity, the shift toward market-oriented economic policies, and more

democratic governance are combining to raise the demand for skills and informed public policy decisions. These changes raise the pressure on governments to implement policies that will pave the way to prosperity. The rapid improvement in information technology and knowledge-sharing arrangements through partnerships and networks makes it possible to meet such demands.

To improve public services and policy dialogue, some African countries are pursuing reforms to professionalize the public service. As discussed earlier, second-generation civil service reforms aim to reintroduce meritocracy in public service, to restructure incentives in favor of a professional cadre, and to pursue institutional rationalization to enhance the functionality and cost-effectiveness of public service delivery. These may have two positive effects on the demand for skilled and professional employees. First, direct effect will be a rise in the demand for professionals, increased educational standards for entry into public service, and further training on the job. A second effect is indirect, through the beneficial impact of improved governance of private investment. Excessive bureaucracy and nontransparent governance typically raise a firm's managerial and risk costs. Their reduction should augur well for private investment.

There is a slow but robust process of liberalizing political systems underway in Africa, albeit with teething difficulties. Pressure is also mounting for devolving authority to subnational governance entities. Both developments will raise the pressures for greater inclusiveness across stakeholders in designing development programs and will fundamentally change the accountability systems to fit more open governance structures. A strong civil society will enhance the demand for informed participation in shaping the development agenda. As pointed out earlier, the growth of a robust civil society depends on the domestic presence of professions and technical skills to engage in the development dialogue and enhance its role as a watchdog of prudent public policy and the application of good governance.

Adapting the Tertiary Education System to the Challenge of Containing Human Capital Flight

The ongoing evolution of the tertiary education system in Africa is geared toward meeting market needs. In this respect it augurs well for boosting and meeting the local demand for skilled personnel. However, the sheer magnitude of the capacity gaps to be filled and the wide range of required specialists makes this task daunting both in terms of the financial costs and the expansion of the scope to meet the wide range of specializations now emerging in the context of the knowledge economy. Public funding can support high-quality tertiary education only when the system is relatively small and hence inevita-

bly elitist (Barr 1998). Therefore, the transition to the provision of large-scale and varied tertiary education entails significant supplementary resources from the clients, the development of curricula that are responsive to the needs of clients, and the harnessing of global knowledge systems for enhancing quality and filling gaps in local faculty expertise.

To meet these goals, the main challenges to African institutions of higher learning revolve around five main areas of action.

1. Higher education must respond more rapidly to social needs. Traditional universities in Africa need to sharpen their responsiveness to the rapidly changing needs of the societies they serve and subject their programs to global pressures for excellence. Public universities in Africa, in particular, face a daunting task in moving away from the elitist model and the associated rigidities of tradition for managing their affairs. Makerere University in Uganda offers an innovative example of a traditional university in Africa that is pursuing a transition from an elitist and predominantly public-financed institution to a more market-oriented approach funded largely by private resources. In the past six years, Makerere University has taken a number of interrelated measures to secure alternative financing, introduce demand-driven courses, and set up new management structures consistent with the new approach (Court, 2001). The success of these initiatives is paying off in terms of doubling enrollment, raising the proportion of privately sponsored students to over 50% of total enrolment and 80% of admissions, and increasing the motivation and salary of faculty. "Practical and professional career purpose (of courses offered) suggests that an estimate of demand rather than a prescription of supply is influencing the academic curriculum" (Court 2001: 7). Makerere's experience suggests that a transition is both feasible and desirable.
2. Rationalization of the tertiary education system is necessary to weed out dead wood and make the capital in these institutions available to alternative uses within the education sector. Private universities and other private tertiary education institutions, many of them set up after the new approach to tertiary education began taking root, are geared toward meeting the increasing demands for nonconventional and nonacademic courses for local needs and employment opportunities. As Court (2001) notes, these universities have proved themselves to be flexible, unencumbered by a particular tradition, creative, experimental, responsive, and inclusive. A number of public tertiary education institutions were set up to target very specific public enterprise or service needs such as

the leather or sugar industry. Often these institutions do not have adequate demand to justify overheads nor are they sufficiently flexible to train people in other skills. The problem has grown more acute with the demise or privatization of a number of these public enterprises, prompting rationalization measures.

3. Quality control and independent certification are critical for a rapidly evolving tertiary education system. As shown above, independent postgraduation certification is playing that role in the case of professional courses and training in specific skills. Apart from embedding this accountability instrument systematically in the larger knowledge certification system, a progressive movement toward applying international standards in the certification process would ensure a beneficial effect in the quality of training programs.

   Furthermore, as multinationals relocate to the region, a pool of skills meeting international standards would help sustain such a relocation and raise returns to the graduates. The problem of accountability for nonprofessional courses is harder to tackle. External examination, collaboration with foreign institutions of repute, and networking have been identified as mechanisms that are now emerging to facilitate quality control. More systematic incorporation of these arrangements, especially in the university education systems, could be facilitated by new actors, such as the Association of African Universities and the Association for the Development of African Education.

4. Regional or subregional collaboration in the African context, where a critical mass of professional peer pressure within national confines is largely wanting, is desirable to exploit complementarities in strengths and capabilities and to project a strong professional visibility of the region on a global scale. Networking also helps to sustain the quality of higher education and to prevent the atrophy of skills, given that it provides opportunities for professional interaction well beyond boundaries and helps create a professional ethos and *esprit de corps* on a larger scale.

   More specifically, effort and resources should be channeled to support and sustain the emerging regional and subregional research and training networks. They are attractive because they are a cost-effective means to build the capacity of national institutions and provide a platform for professional peer pressure. A key target will be to reduce professional isolation and the resultant atrophy of acquired skills. Graduate training networks allow the pooling and sharing of scarce quality faculty, apply peer pressure in enforcing standards in curricula, and help in exchanging experiences across participating institutions. Efforts should be made

to promote the role of these networks as intermediaries to access frontier knowledge in a cost-effective manner by providing current literature and arranging the involvement of world-class resource persons in the research process. Furthermore, regional networks can serve as building blocks for global partnership arrangements.

Some networks have successfully attracted the involvement of highly qualified Africans from the diaspora in the development dialogue and initiative. This objective should be pursued more vigorously in conjunction with the broader scheme of the involvement of African professionals abroad discussed below.

5. Cost-effectiveness in the delivery of tertiary education is necessary to survive strong local and world-wide competition. The advent of information technology has widened the scope of competition through lower-cost access to alternatives abroad and a tendency toward unified global knowledge standards. Cultivating innovative and entrepreneurial attitudes among the managers of these institutions is of prime importance. Public universities need to be given the space and autonomy to innovate. Tertiary higher education institutions should also exploit the potential advantages of product differentiation based on area-specific needs.

Strategies for Reversing Brain Drain

Here I consider three possibilities for permanent or temporary repatriation of qualified Africans abroad: assisted permanent return, the use of African talent in the diaspora, and the use of qualified African emigrants in technical assistance schemes.

Repatriation Programs

Between 1993 and 1999, the International Organization for Migration (IOM) in partnership with the U.N. Economic Commission for Africa (UNECA), ran a program for the repatriation of qualified African emigrants. The Return of Qualified African Nationals (ROQAN) program matched particular needs for skills by governments, academic and research institutions, and private sector employers in African countries, with candidates who were willing to return home and then provided financial support for their resettlement. The program succeeded in repatriating 2,000 African emigrant experts to six countries. The high cost of repatriation goes a long way in explaining the moderate success of this program.

Involving Africans in the Diaspora

Since many of the migrants may not return, African countries and the migrants themselves need to devise creative strategies to turn these professionals into assets for Africa. To achieve this goal, it is important to design a scheme that allows skilled Africans working abroad to contribute to the development of their home countries without giving up the higher wages and better living standards afforded by their residence abroad. This approach will also enable the large number of African intellectuals and intellectual communities abroad to participate more actively in strengthening the capacity for quality education and training in the region.

While plans are underway to continue with the ROQAN, the IOM has proposed a new initiative entitled "Migration for Development" which involves three types of interventions: "temporary return," "virtual return," and "economic return." The initiative targets the involvement of qualified Africans in the diaspora to participate in development activities in the region for limited periods of time.

Under the temporary return arrangement, a qualified doctor, for example, would be assisted to return home to teach, perform operations, and share skills for a limited time period. A virtual return program would involve skill sharing, teaching, mentoring, and even marking exam papers via the Internet and video conferencing. This approach is considered particularly attractive because of its cost effectiveness. The economic return program would encourage African professionals with adequate capital or access to it, to invest in their home countries or the region. The program would provide information on investment opportunities and facilities for channeling capital to the region.

Utilizing African Emigrants for Technical Assistance

It has been estimated that 100,000 foreign experts are deployed annually in African countries at a cost of nearly $4 billion per year. The policies for this deployment largely preclude the use of nationals, even if they are qualified. Haque and Aziz (1998) explore the cost and skill profile of technical assistance if national emigrants were deployed under technical assistance programs. A key premise of their argument is that, for each skill category, the emigrant would be willing to accept a much smaller premium to return and perform the required task than would a foreign national. This premise is particularly consistent with the observation by the IOM (2000) that most African migrants maintain social and cultural links with their home countries. They would therefore likely be more willing to "suffer" a premium reduction than their foreign counterparts.

In their analysis, Haque and Aziz conclude that deploying emigrants for technical assistance would raise the overall quality of the skills deployed on account of the differential premiums. Furthermore, the total cost of providing the same level of technical assistance would be lower or the total level of technical assistance could be raised substantially within the current budgets. This is an option worth exploring.

Conclusion

African brain drain is a problem and manifests itself predominantly in terms of a rising level of higher skilled emigrants. This phenomenon leaves the region without the expertise necessary to support higher growth and to reduce poverty. The primary cause of the human capital outflow appears to be a combination of relatively lower returns to investments in tertiary education, risks of professional atrophy due to lack of interaction with peers and the professional frontier, and the absence of the necessary tools for professional engagement, particularly among the highly specialized professions. Political instability affects emigration of both skilled and nonskilled Africans.

The problem is set to intensify in the foreseeable future due to the intensification of the globalization process, reduced costs of movement, and demographic pressures. Rapid expansion of the economically active population in developing countries, particularly in Africa, and the pressures for young replacement immigration in the developed world combine to exacerbate the consequences of easier mobility.

Globalization, on the other hand, has raised the potential for relocating jobs to Africa through foreign direct investment. In combination with the ongoing reforms to professionalize the public service and the beneficial role of knowledge intermediaries, the potential for raising the demand for skills and productivity at home are real. Higher growth resulting from increased utilization of skills, in turn, sets off a virtuous cycle of interaction between growth and improved human capital in the region. Furthermore, globalization has strengthened the rationale for knowledge sharing in a more interdependent world.

To meet potentially higher demand requires a more market-oriented approach in the delivery of tertiary education in the region. Although encouraging changes are taking place within private tertiary education institutions, the bigger challenge is for traditional public-funded universities to be responsive to the changing needs of their clientele by fostering cost-efficiency in the delivery of education and by rationalizing the use of other public-sector tertiary education institutions. Many of the latter category have become obsolete and cannot adjust to the changing demand patterns.

A fundamental requirement for ensuring better quality of the range of institutions and products is to strengthen the sector's accountability system. For the professional courses, this will be best achieved by strengthening the system of independent post-graduation certification. For nonprofessional courses, however, the method is to embed the external examination system and apply peer pressure for maintaining quality through collaborative arrangements and networking amongst unequals, within and outside of the region. Linking the local certification systems to the global standard system will improve the overall reputation of the tertiary education system in Africa.

Finally, there are ongoing measures to reverse brain drain and make use of qualified Africans in the diaspora. Repatriation programs have had modest success but are limited by associated high costs. A new initiative is being contemplated between the IOM and African countries that is focused on making use of African talent wherever it may be. The three components of this initiative are the African's temporary return to perform tasks and train others, a virtual return using information technology, and an economic return through encouraging investment at home by Africans abroad. The first two components of this initiative would also strengthen the capacity of the tertiary education system to deliver better and more useful products.

Notes

1 The views expressed in this paper are attributable solely to the author and not the World Bank for which the author works. He wishes to acknowledge the able assistance of Prosper Chale, a research assistant to the Macroeconomic Unit at the World Bank Country Office in Dar-es-Salaam.

2 Barro (1998) actually shows that while secondary and higher levels of education are positively correlated with growth, primary education often does not significantly correlate with growth or has the wrong sign. The latter insignificant impact is obtained more widely in the endogenous growth empirical research.

3 Barro (1998) finds that female schooling in the same education and age category does not have a significant impact on growth, most probably due to discriminatory practices in the labor market.

4 This is a fairly recent strand of research, which began with Mountford's (1997) work and has been subsequently followed by a small group of research papers by Galor and Tsiddon (1997), Docquier and Rapoport (1997), and Vidal (1998).

5 The economically active population in developing countries increased by 59% between 1970 and 1990 due to young age structure, namely, high fertility and declining infant/child mortality (Russell 1998).

6 Heller and Tait (1984) showed that, during the late 1970s and early 1980s, the ratio of public wages to private wages in developing countries was lower than in industrial countries, despite the reverse expectation, since governments in poor countries

with an insignificant private sector would usually employ a relatively higher proportion of quality human capital. In the case of Africa, the experience has been not only of an annual 9% trend decline in real wages over the 1970s and 1980s but also a 6% decline per year of public sector wages as a ratio to private sector wages.

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Social Value of Research and Technical Skills: Does It Justify Investment in Higher Education for Development?

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Abstract

Evidence assembled from household surveys collected from 1985 and 1998 from Ghana, Côte d'Ivoire, Kenya, and South Africa indicates that higher wages compensate individuals in these African countries for enrolling in school. It is commonly believed that wage returns to schooling are highest at the primary levels and decrease thereafter at higher school levels, but the data from Africa summarized here indicate the opposite, with private wage returns being highest at the secondary and higher education levels. There appear to be sufficient financial incentives today to motivate students to enroll in higher education, and any public subsidies should be allocated only to those students who come from poor families and whose parents are relatively least educated, relative to their generation. If students in higher education in Africa from upper-income families paid tuitions which were equal to half the public subsidies for their schooling, these revenues would finance fellowships for disadvantaged students and also provide the resources and incentives to expand higher education into those fields where trained manpower is scarcest today in Africa. They would thus create the conditions for greater self-governance of higher education while fostering a responsible separation from political power.

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Résumé

Les résultats provenant des études domestiques, collectés de 1985 à 1998 au Ghana, en Côte d'Ivoire, au Kenya, et en Afrique du Sud indiquent que dans ces pays, les salaires élevés servent de compensation aux individus, pour qu'ils puissent s'inscrire à l'école. L'on croit généralement que les retours de salaire pour la scolarité sont plus élevés au primaire et diminuent au niveau secondaire, mais les données sur l'Afrique résumées ici prouvent le contraire, et montrent que les retours privés sur salaire sont plus élevés au niveau du secondaire et du supérieur. Il semble y avoir aujourd'hui suffisamment de mesures incitatives pour motiver les étudiants pour qu'ils intègrent l'enseignement supérieur et toutes les subventions publiques doivent être attribuées uniquement aux étudiants issus de familles pauvres et dont les parents ont reçu un niveau d'éducation relativement faible par rapport à ceux de leur génération. Si les étudiants africains de l'enseignement supérieur de familles aisées payaient des droits de scolarité correspondant à la moitié des subventions publiques, ces revenus ainsi engrangés pourraient alors financer des bourses pour les étudiants défavorisés, mais également fournir des ressources et des mesures incitatives pour développer l'enseignement supérieur dans les domaines où il existe peu de main-d'œuvre qualifiée sur le continent. Ils permettraient ainsi de créer des conditions adéquates pour une meilleure auto-gouvernance de l'enseignement supérieur, tout en assurant une séparation raisonnable d'avec le pouvoir politique.

Introduction

In the last two decades, many countries in Africa have had difficulty building or even maintaining high-quality university training and allied research institutions. Opinion is divided on how to refocus resources and determine priorities to improve the prospects for higher education. To assess how well resources are allocated to higher as well as lower levels of education, I first illustrate how the economic returns of schooling for adults who have obtained more schooling in the past are calculated and then describe how these returns to higher education are currently distributed by social and economic classes in Africa. Recent household surveys from several African countries are analyzed to approximate the efficiency of returns to higher education, which appear substantial and are larger among younger than older Africans, suggesting that they may be rising over time. The distribution of these returns to higher education, however, is inequitably concentrated among upper-class families. Thus, the policy dilemma facing Africa is that workers with postsecondary schooling are being well rewarded in relative terms for their investments in education but that these rewards, which are highly subsidized by the public sector in Africa,

are captured predominantly by the relatively rich. The challenge for Africa is to design institutions to increase the opportunities for higher education but distribute these benefits more widely.

What are the options for improving the personal distribution of benefits from public expenditures on higher education, and are there examples of "best practices" which might be replicated in Africa to return more of the benefits to the children of the poor? Can poor societies achieve a more equitable access to higher education by quotas, targeted subsidies, scholarships, or student loans? Has the effort to reduce the educational gap between men and women been successful? If efforts to achieve gender equality are subject to diminishing returns, how should priorities now be modified in light of the progress made? And where do policies need to be strengthened because the objectives have not been adequately realized? How does the globalization of trade and capital markets, along with the decreasing cost of immigration, particularly for educated workers, change the landscape and modify the maneuverability of national educational policy in Africa and other regions with low?

This is a long agenda and I will touch only on the two salient economic criteria of performance for public policy, that of *efficiency* (increasing outputs for a given level of public and private inputs) and that of *equity* (increasing the private benefit from those outputs relative to the private costs among the poorer strata of society). These strata include families residing in rural areas and remote towns, and children born into families in which economic resources are least adequate, and to parents who are themselves the least educated in their generation. My neglect of the political questions is not because I think they are less critical than the economic but as a reflection of my personal comparative disadvantage to clarify how the political realities contribute to, and affect progress in, the education sector in Africa. The political institutions needed to advance a more efficient and equitable higher educational system on the African continent are likely to be paramount but are neglected here for the reason noted.

Schooling, Wages, and Educational Priorities

There is not likely to be agreement on the criteria by which to set priorities in education, and higher education is particularly complex. Higher education performs many functions. The outputs are often difficult to measure and value in comparable terms, and those with a large stake in higher education—politicians, administrators, teachers, researchers, students, and the parents of possible students—often have conflicting objectives. Where does one start?

Since the 1960s, it has become increasingly common to analyze the structure of wages between workers with more and less schooling and to view these wage differentials as private productive pay-offs for attending school.[1] Private and social costs of schooling can be deducted from the benefits associated with wage differentials, properly discounting both costs and benefits to some initial point when it is decided whether or not the child will continue to enroll in school. About half of the private costs of attending school is the value of the time that students spend in school and in preparation for school, which their families forego to keep them enrolled and matriculating through the school system.

Mincer (1974) proposed a rough approximation for estimating the internal rate of return that an individual gets back in higher adult wages on the opportunity costs he incurs as a student attending school, expressed in present discounted terms of relative units of the market wage rate. Mincer noted that this return could be estimated by fitting a logarithmic-wage function using standard regression methods (that is, ordinary least squares) to individual data from a random household survey that collected information on the wages of workers, along with their age, sex, schooling, within a single labor market. By assuming that the productive value of a student's time throughout the year he or she enrolled in school equaled the sum of the student's foregone wages and the direct private costs of schooling (e.g., books, travel, tuition, school clothes or uniforms, etc.), then the percentage gain in wages which is associated with an additional year of a worker's schooling approximates the family's internal rate of return to schooling, holding constant for a quadratic approximation for the effects of postschool experience on the log wage.

Although Mincer examined only the first public use sample from the 1960 U.S. census, his choice of a semi-log functional form fit to cross sectional data on schooling years and postschooling experience of males has become the benchmark throughout the world for summarizing wage structures and interpreting school returns (Mincer, 1974, Table 5.1). Scores, if not hundreds, of household surveys from all regions of the world have been examined using his simplified model specification. Estimates of private returns to schooling are inevitably compared with returns to long-term physical capital investments, such as bonds.

There are nonetheless many differences between human capital and financial instruments, notably the lack of liquidity or marketability of human capital that alters its collateralization and risk; and undoubtedly many students and families receive substantial consumption benefits from education which increase their private demands for schooling.

Empirical estimates of the share of the student's opportunity costs in the family's private total costs of school attendance tend to be on the order of one half or more in low-income countries, rising perhaps for higher education (Psacharopoulos & Woodhall 1985). Thus, Mincer's (1974) approximation of private schooling returns implicitly assumes that the private opportunity costs of schooling are equal to the wage received by other children with the student's initial level of schooling and age. If school occupies half of the time of a student in any particular year, other private costs of attending school are attributed to the other half of the child's annual productive value of time. Unfortunately, household surveys have not been notably successful in measuring what a child's working time is actually worth to a family, for most children labor as unpaid family workers, and all parents are not effective in extracting the entire working effort of their children when they are not enrolled in school.

From a society's viewpoint, moreover, the educational system consumes public resources to provide school structures, teacher salaries, school supplies, and administrative expenses, even though the public sector may offset some of these outlays with school and examination fees, local taxes earmarked for education, and income and wage taxes paid by the students as working adults. These wage taxes are likely to increase, because more educated workers allocate more of their time to work in a "covered" job from which the government can deduct taxes and because better educated workers are paid more per hour worked. It should be recalled, however, that governments in low-income countries tend to collect a relatively small share of their revenues from personal income, wage, or consumption taxes (e.g., VAT) and, hence, do not in fact recover much of the costs of public education from such taxes (Burgess 1997).

If these public costs and revenue returns to schooling are added to the private costs and wage returns on which Mincer's *private wage return* formulation is based, a *social return* to schooling can be calculated. It is expected that such social returns to schooling, neglecting elusive social externalities which are discussed later, would be lower than the Mincerian private wage returns and that this gap between private and social returns tends to be especially large for higher education in low income countries (Psacharapoulos & Woodhall 1985). Although the public costs of higher education tend to be somewhat larger than those of primary and secondary education in high-income countries, the public subsidies for a year of higher education in low-income countries can be 10 to 40 times larger than typical primary or secondary school public subsidies per year of enrollment (Psacharapoulos & Woodhall 1985).

If the social benefits of schooling which are not privately realized by students and their families exceed the social costs of schooling, there is an efficiency argument for society to subsidize more of the costs of schooling or

increase public net educational expenditures. But if the former argument does not hold and the total social (including private) returns exceed the costs of borrowing capital to the government, then the justification for additional public spending should be considered in the context of a specific failure in the market for schooling that has led to the suboptimal private investment in schooling. One possibility is that either imperfect information about prevailing returns or credit constraints limit the poor's ability to invest in their human capital.

In this second situation, where the private returns appear themselves sufficient to call forth additional private investment in education, it is particularly important that public subsidies reduce the inequality of educational attainments. It is widely noted that public subsidies for education tend to be much less equal at the level of higher education than they are at the primary and secondary education levels (Colclough 1997; Hinchliffe 1993; Jimenez 1987; King 1997; Tilak 1997). Thus, private returns may strengthen an efficiency argument for public investment in higher education, but special policy instruments are needed to avoid public expenditures on higher education if it will cause a more unequal distribution of income in the future.

Social Externalities of Schooling

From the earliest application of this cost-benefit framework to the assessment of the productive contribution of education to the economy, it has been observed that education is desired by families and by society for many reasons in addition to its capacity to raise the productivity of a worker. Human capital offers only one perspective on education, although one that can be quantified and monitored over time. Those who are engaged in producing education, in designing tests to measure students' comprehension, or in evaluating the accomplishments of the broader educational system for society do not necessarily find the concept of human capital an attractive one, for it assigns a private value to education based on its apparent productivity in the wage labor market. There are many who see education as a merit good, which all people deserve to receive and which a good society should be willing to sacrifice for all to receive. Nonetheless, the question remains as to how to set social priorities: How much and what kind of schooling should a country produce, given its available resources?

Social externalities from education are benefits that are not realized in terms of private human capital or consumption benefits accrued by those who make the sacrifices to obtain the education, nor are they realized in increased output and profits by firms which employ the more educated worker. It is plausible that mass education should be seen as the backbone of a functioning democ-

racy, as well as an engine of modern economic growth (World Bank 2000). Social externalities of education which are not captured in the profits of private firms are one hypothesized mechanism to account for "endogenous growth" which can coexist with competitive markets and account for increasing returns (Lucas 1988; Romer 1986). However, few empirical studies have succeeded in measuring these social external benefits of education or even in suggesting the context in which they are expected to be most salient—for example, at the level of the nation-state, city, or local community.

Particular types of scientific education and allied research and development activities have been linked to the generation of social external benefits because they produce productive knowledge which may diffuse relatively freely in society. This knowledge may not be produced in sufficient amounts if left to private market incentives alone. The product of these allied training and research activities may also be most valuable in a limited geographic area and, therefore, provide solutions to local problems which are not readily transferred to neighboring regions without considerable investments to adapt them to new conditions. Consequently, to realize the benefits of these activities, they should be initiated close to where they will be used.

Two examples illustrate the special nature of these forms of higher education which are likely to engender social externalities. Agricultural sciences and biotechnology develop new inputs for the farmer, such as high-yielding varieties, which raise outputs and reduce the cost of production, thus contributing to reducing the relative price of agricultural commodities for the consumer. But these new agricultural inputs are often narrowly adapted to a specific latitude (that is, length of day), climate, and local pests. For similar reasons, public health research may help control endemic and epidemic diseases which specialize in climate, parasitic vectors, and population density and thus become localized. Consequently, they may require locally designed control interventions and policy evaluation studies.

These two types of higher education, in agriculture and public health, combined with applied research may be associated with a social externality, not only because they may have their greatest benefit for a specific segment of the world's population but also because the benefits are not readily appropriated through the sale of a product or service which would encourage optimal levels of production or consumption. Small-scale farmers and dispersed consumers may gain individually from the farmer's adoption of new plant and animal varieties but cannot normally coordinate actions to accomplish the investments in the development and diffusion of these new inputs.[2] In the case of disease control, preventive measures may benefit third parties through reducing their exposure to communicable disease. For example, coordinated mass vaccina-

tion or mosquito eradication campaigns can reduce a disease within portions of the population who do not personally incur the private costs of adopting preventive measures. These social externalities are typically cited to justify public expenditures and subsidies for such campaigns against communicable diseases. These types of agricultural and public health research and development efforts are thus subsidized by the public sector. But even in this case, researchers in these critical fields could be trained in another location where the training costs are lower, perhaps because of economies of scale and other complementary factors. When they complete their education, they would be assigned to a government-subsidized research institution located in the geographic region where these local externalities are expected to be most substantial. The example of the Consultative Group on International Agricultural Research (CGIAR) family of International Agricultural Research Centers is one institutional response to this situation, and the World Health Organization (WHO) or Centers for Disease Control (CDC) also support such regional field research centers devoted to the development and evaluation of disease control technologies in different geographic areas, including Africa. The International Center for Diarrhoeal Disease Research in Bangladesh (ICDDR,B) in Dhaka and Matlab is a well-known example where biological and social sciences have been combined.

In the more general case of higher education, there is scant evidence confirming the quantitative importance of social external return to education in high-income countries, where theory suggests it should be most salient and where data should be sufficient to detect its impact.[3] Nor do I know of studies of the social externalities of higher education in low-income countries, even in the plausible specific fields of agricultural science and public health. Are we left to rely on the intuition of educational leaders and of economic and political elites?

A growing number of low-income countries, including many in Africa, collect surveys from a random sample of households, which include standard data modules on education, wages, earnings, and other socioeconomic characteristics of workers. This data can illuminate the productivity of different groups of workers in the wage labor force and thus begin to clarify one source of private investment incentives for expanding different branches of education. In the future it may then be possible to combine wage benefits of schooling and more accurate information on the public costs of schooling to infer social returns. At the moment, however, the foundation of scientific evidence for general social externalities to higher education is weak. The case should therefore be initially based on wage returns and revised as further information on consumption benefits, public costs, and externalities become available. The best documented

examples of social externalities associated with schooling involve basic education and its consequences on home production processes which first benefit the family but also spill over to benefit other members of the society. Most of the examples I know involve the formation of human capital in children. It can be argued that societies should not necessarily always encourage more investment in future generations, for this typically involves the sacrifice of consumption of the current, relatively poor, generation for the benefit of a future generation which should enjoy a higher standard of living. But most societies nonetheless view such human capital investments in children as a state-assisted activity. Most micro-empirical studies of child development find that increases in the schooling of the mother are associated with improvements in child developmental outcomes and also find that these effects tend to be larger than those associated with the same increases in the years of schooling of the father. This holds true whether the development indicator is birth weight, child survival, good nutritional status as proxied by height or weight-for-height at a given age, age of entry into school, school enrollment adjusted for age, and years of schooling completed upon reaching adulthood (Schultz 2002).[4]

The other potential externality of schooling relates to fertility, which is inversely related to women's schooling. On balance, the evidence suggests that increments to the schooling of men, holding constant only for the educational attainment of women, are associated with *increases* in fertility in many poor agricultural countries (Schultz 1994). The social cost of high fertility and rapid population growth are not easy to quantify with available scientific methods (National Research Council, 1986), but many countries have concluded that their society stands to gain in the long run by slowing rapid population growth. This conclusion would justify assigning a higher priority to basic education, especially education. All human capital intergenerational externalities of schooling favor society promoting the schooling of females, but most studies have concentrated on the effects of primary and secondary education. Higher education is not generally stressed as a means for promoting these goals of slowing population growth and increasing the accumulation of child human capital.

What to Infer from Wage Differences by Schooling?

Many scholars of developing countries are skeptical that wage differentials are a satisfactory indicator of the relative productivity of heterogeneous labor or even a sign of the economic scarcity of different classes of workers in the private wage sector. For example, a World Bank analysis of Côte d'Ivoire reports earnings differentials which that imply each year of schooling of a worker is associated with his or her receiving on average a 23% increment in earnings,

after holding constant for the sector in which the worker is employed (formal or informal, government, public enterprise, or private firm). The authors conclude their discussion of their estimated wage function by attributing the high private rate of return to imperfections in the labor market. They caution that it is "reasonable to link this result to rigidity in salary scales." And without offering further evidence, the authors conclude that "there is probably considerable room for reduction in wages and salaries throughout the modern labor market that would make wages and salaries more competitive" (Berthelemey & Bourguignon 1996: 48). No description is provided of an empirical test for market wage rigidity, or how they propose to achieve a reduction in wages in the modern sector; but the assumption that labor markets in low-income countries are seriously distorted (i.e., by unions and governments) has a long and influential history in development economics from Lewis (1954), to Fei and Ranis (1964), and Harris and Todaro (1970).[5]

From the perspective of university administrators and personnel, the benefits of having more graduates of higher education in low-income countries extend well beyond the productive earning capacity of those who receive the higher education. The World Bank's Task Force on Higher Education and Society argues:

> Rate-of-return studies treat educated people as valuable only through their higher earnings and the greater tax revenues extracted by society. But educated people clearly have many other effects on society: educated people are well-positioned to be economic and social entrepreneurs, having far reaching impact on the economic and social well-being of their communities. They are also vital to creating an environment in which economic development is possible. Good governance, strong institutions, and a developed infrastructure are all needed if business is to thrive—and none of these is possible without highly educated people. Finally, rate-of-return analysis entirely misses the impact of university-based research on the economy—a far-reaching social benefit that is at the heart of any argument for developing strong higher educational systems. (World Bank 2000: 39)

Quantitative evidence and analysis are not marshaled in the World Bank's report in support of these views.

These two examples span a field of skeptics who implicitly reject the value of systematically consulting empirical evidence on wage structures to infer relative scarcity of skills in developing countries. The first point of view discounts the measurement of large differences in wages between educational groups as due to unspecified distortions in the labor market, and the second

denies the relevance of presumably small wage differentials associated with higher educational attainments in low-income countries as due to the neglect of unquantifiable, but clearly important, social externalities. In the 1980s, it could be conjectured that "the proliferation of models and the lack of attention to testability stems from the lack of good data" (Binswanger & Rosenzweig 1984: 40). But even in 1984, the authors forecast that the improvements in survey data for Asia should bring to an end the era of development economics which neglected to integrate theory and data regarding the performance of workers in low-income labor markets. The gains in household and labor force survey data in Africa in the last decade have been almost as dramatic, but there are still few African countries which use these surveys to evaluate programs and policies or inform priorities in education. Meanwhile, an econometric literature has begun testing hypotheses advanced for why estimated wage functions might be biased or misleading (Card 1999). Although this field of research in labor economics is dominantly directed to the study of wage structures in high-income countries—and notably the United States—the issues of statistical bias and measurement error do not seem fundamentally different in low- and high-income countries.

Wage differences between workers with various amounts and types of schooling provides initial information on private returns to schooling which may then need to be adjusted to take social costs and benefits into account. The most common concern with these direct measures of wage returns to schooling is that other determinants of the wage have not been adequately taken into account and that these "omitted factors" may themselves be plausibly correlated with schooling. Consequently, some of the influence of the omitted factor on wages will be spuriously attributed to schooling. These omitted factors could be related to the productive capacity of the individual worker (i.e., as ability, health, mobility, preferences) or to the process of sorting individuals into better-paying jobs (i.e., family connections, ethnicity, and other market imperfections such as the political allocation of government jobs or employment in public enterprises).

There is no entirely satisfactory way to deal with the bias potentially introduced by all such omitted variables, but two empirical strategies warrant discussion. Either the social statistician attempts to measure the omitted factor and to include it while estimating the wage function (and thereby focuses on the partial association conditional on the control variables), or else the statistician specifies an "instrumental variable" that is associated with schooling but which is assumed to not be correlated with the omitted variable.[6] The original motivation of this literature was to correct for the omitted "ability" and "family socioeconomic status" of the worker which were expected to overstate the

wage function returns to schooling. But these expectations have not been confirmed with any consistency by the extensive empirical literature. The first generation of evidence concluded that the magnitude of this total bias in estimated returns was small, probably because the omitted variable upward bias was offset by errors in the measurement of education, which would bias downward the ordinary least squares (OLS) estimate of the effect of education on wages (Card 1999).

Card (1999, 2001) interprets instrumental variable estimates as also suggesting that there exists heterogeneity in "response to schooling treatment" of individuals. Different instrumental variables often measure the impacts of the supply of educational opportunities in an individual's residential area, which might advance the schooling of a different subpopulation for whom the returns to education need not be the same. Thus, the policy implications of estimated returns to schooling depend on the choice of instrumental variables that simulate the effect of a specific policy operating at the margin of a specific sample. In exploring the robustness of wage returns across a variety of such interventions (that is, instrumental variables), a policy researcher could be encouraged to discover those interventions that achieved both a high return and a favorable socioeconomic distribution of benefits.[7] My effort to assess the robustness of instrumental variable estimates of overall educational returns in Côte d'Ivoire and Ghana did not find that they changed significantly from those estimated directly by ordinary least squares (Schultz 1999). I do not know of any instrumental variable estimates of wage returns to higher education in Africa.

Instrumental variables in the form of distance and access to school from the respondent's childhood household were used to estimate the private wage returns to schooling attainment for a sample from the Bicol Province of Philippines in the 1990s. The instrumental variable estimates of schooling returns are about 60% larger than those obtained by ordinary least squares, with or without correcting for possible sample selection bias (Maluccio 1997, Tables II.2, 3, 5). In Indonesia, when district school construction programs are used as an instrument for school attainment of respondents who were then of school age, the instrumental variable estimates of return to schooling in the 1990s is only slightly larger than those estimated by ordinary least squares (Duflo 2001). I see no clear basis for concluding from existing evidence that OLS estimates are overstatements (or understatements) of the returns to higher education in low-income countries generally or specifically in Africa.

The size of household surveys is a limiting factor in the analysis of higher educational returns. First, the fraction of the adult population which works for a wage and thus provides information for estimating a wage function may be small in a low-income African country, particularly for women.[8] The fraction

of the population with any higher education will also be very small. The only solutions to this problem are to expand the size of the survey or to oversample the better educated, perhaps by geographic stratification of the sample. This is implicitly already occurring when surveys are stratified and when the relatively small fraction of the population residing in urban areas—those who also happen to be among the better educated—are oversampled.

Contemporary labor force surveys document not only that wages differ by schooling but also that wages differ between workers with different years of postschooling experience. Presumably this is the case because they acquired training on the job and this work experience or maturation raises their productivity. When the wage is expressed in relative terms, or in logarithms, wages increase with years of postschooling experience, but at a diminishing rate in the cross section. This is approximated by a quadratic form in experience, in which the coefficient on experience squared invariably receives a negative sign when workers of all ages are pooled (Mincer 1974; Rosenzweig & Wolpin 2000).

Analyses of wage structures confirm that an increase in the relative supply of older or younger workers of a specific education level, who have more and less experience, reduces their own group's wages and thereby exerts a smaller "supply effect" on neighboring groups in the labor force with dissimilar amounts of experience or schooling. In other words, these groups are imperfect substitutes for each other in production. To make today's educational training opportunities more efficient, the wage differentials by education which are most relevant to policy are those among young recently graduated workers.

Consequently, if the wage returns to higher education are much lower among the young compared to the old, one possible conclusion is that the supply of educated workers relative to the derived demand for educated workers in the economy is larger than it was in the previous generation. The wages of young educated workers decline relative to those of young less-educated workers in order for the economy to employ the increased supply of educated youth. This was the conclusion drawn from a study of Kenya during the 1980s (Knight & Sabot 1981, 1990). By estimating wage returns within narrower age groups, any trend across age groups is offered as suggestive evidence of an evolving "imbalance" between supply and demand of educated workers. Wage returns may also rise with experience for a birth cohort as it ages if schooling and postschooling experience are complementary in production, but this possibility can be adequately assessed only when a repeated series of cross sectional surveys are analyzed (e.g., Card & Lemieux 2001).

Estimates are reported in the next section for two age groups, the young (age 25–34), who should have completed their education and entered the labor force, and an older group (age 35–54). The older group excludes those age 55

and older among whom health limitations and retirement begin to impact productivity and possibly change the composition of the working sample, which could potentially distort measured returns. The cost of disaggregating the sample by age is that, with smaller sample sizes, the return estimates are less precise.

A few country examples may suggest patterns prevalent in Africa and indicate how far the data can help to set priorities regarding the levels of education that are currently needed. Given the reluctance of leaders of higher education to consider these wage patterns for policy purposes, it is ironic that in those countries for which I could obtain data the returns to higher education appear to be substantial and possibly rising. Within the limited scope of this paper it is not possible to incorporate the public costs of these levels of schooling to approximate even rough estimates of the social returns to higher education.

Country Estimates from Household Surveys of Wage Differentials

Repeated comparable household surveys on which to base an assessment about the market returns of education over time are available from four African countries. I focus on Ghana because it has experienced long swings in its educational investments and economic growth and because some of its features can be compared with those prevailing in Kenya[9] and neighboring Côte d'Ivoire. Finally, estimates from South Africa are available by four race groups which provides a simple test of how political restrictions in the supply of higher education to Africans affect their wage returns, signaling an inefficient and inequitable economic outcome caused by the past underinvestment in African higher education.

Ghana experienced a difficult economic period following its independence in 1957.[10] Economic growth kept up with population growth only during the first decade, and from 1965 to 1985 real GDP declined. By contrast in the same period, Kenya sustained a growth in per capita GDP of 2% per year, while Côte d'Ivoire grew initially at the same rate as its population, and then accelerated until the 1980s (World Bank, 1986). By the end of the 1980s, Ghana began to revive, while Côte d'Ivoire stagnated, and Kenya expanded rapidly. But in the 1990s the order reversed; Kenya had slowed to an annual growth rate of 2.2%, Côte d'Ivoire had grown at 3.7%, and Ghana at 4.3% (World Bank 2000–2001). Ghana started with much more widespread provision of primary education already in the 1950s, while Côte d'Ivoire and Kenya grew thereafter more rapidly and invested more heavily in their public educational systems, catching up to Ghana, as shown by five-year moving averages of educational attainment in Figures 1, 2, and 3, by gender and age. Against the backdrop of eco-

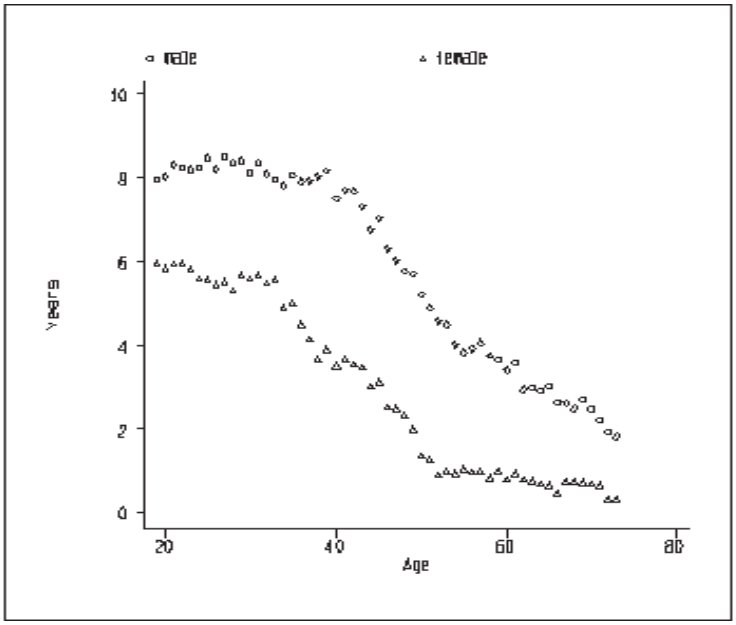
nomic growth and decline in these countries, household surveys can suggest how current wage structures reward those who have acquired more schooling. These implicit "private returns" to schooling are expected to be depressed by a relatively large supply of workers with these schooling skills, and they are expected to be raised by skill-biased technological change (typically unobserved) or by national growth which may boost the relative demands for higher skilled labor.

A nationally representative household survey, the Ghana Living Standard Survey (GLSS) was collected in 1987–1988, 1988–1989, 1991–1992, and 1998–1999.[11] Table 1 reports the regression coefficients from an estimated log wage function on different educational attainment categories for persons age 25 to 54, who report a wage and time worked. The omitted educational category is "none," which included 31% of the males in 1987 and 20% in 1998 in 1987; 55% of females had not received any schooling, and this unschooled share had declined to 40% in 1998. Individuals with only a secondary school certificate were 4.4% of the males and 1.2% of the females in 1987. These figures had increased slowly to 5.2% and 1.9%, respectively, by 1998. University degrees are rare; but including teacher/nurse/technical certificates from postsecondary institutions, the fraction with any higher educational degree was 6.8% for males in 1987 and 8.8% in 1998. Among females the share has remained roughly constant at 2.8%.

The private wage returns per year of schooling between different educational categories, are estimated at the bottom of Table 1. Enrollment in primary to middle school yields modest returns averaging about 4% per year in this period, whereas return between middle and secondary school are larger, averaging about 10%. University four-year degrees earn a return that averages about 16%; but because of the small sample, these estimates are highly variable from year to year and across sexes. The nurse/teacher certificates appear to be well rewarded for a two- or three-year course of study; however, the inability to assign a particular number of years to these courses or those called vocational and commercial precludes drawing any firm conclusions regarding the estimates of the returns to these heterogeneous educational programs, some of which require only primary school preparation for admission.

Table 2 reports the same specification for the wage function for the first and last year of the Ghana surveys but disaggregates by age. The estimates for returns to university training and postsecondary training tend to be larger for the younger birth cohort than the older birth cohort, suggesting that the balance of the supply versus the demand for higher educated workers is becoming more

Figure 1: Years of Schooling Completed in Ghana by Age in 1987: Males and Females



favorable for these best-educated workers in Ghana. It has been common to assume that returns to schooling fall as a student extends his or her education into more advanced levels of schooling (Becker 1964; Psacharopoulos & Woodhall 1985), but this does not appear to be the case in Ghana or in many other low-income countries where the education bottleneck to supply is often at the secondary or university levels (Schultz 1988).

In Côte d'Ivoire the more recent expansion of primary and secondary schooling has occurred during a period of overall growth. (See Figure 2). As shown in Table 3, private wage returns for primary and middle school are larger than in Ghana in 1987-1989 by about 10-12%, either because of the smaller supply of primary graduates in Côte d'Ivoire or the more rapid aggregate growth of the economy which stimulated derived demands for better educated workers. Secondary school is associated with very high 12% to 28% returns. At the university level, returns are variable within these age stratified samples but average 13%. There is no clear indication in Côte d'Ivoire that the returns to the younger sample (age 25–34) are falling relative to the older sample.

Kenya became independent in 1963 and has grown relatively rapidly for Africa, at least until the last decade. Its rapid expansion of education has consumed more than 6.5% of its GNP since about 1980, while private and locally funded secondary schools are also an important feature (Knight & Sabot, 1990; World Bank, 2000-2001, p. 284). In Ghana, the share of GNP spent on public education was 3.1% by 1980 and increased to 4.7% by 1997. Côte d'Ivoire initially spent the largest share of its income on public education (7.2% of GNP in 1980), but this share had fallen to 5.0% by 1997 with the recent retrenchment of the public sector (World Bank, 2000-2001).

Estimates of wage functions for Kenya presented in Table 4 are based on the 1994 Welfare Monitoring Survey II. Wage returns are on the order of 9% at the middle school level, and they tend to increase for women at the secondary level, and probably also in the heterogeneous vocational and technical training programs. At the university level, the returns are high and appear to be larger for women than men, which was not generally the case in Ghana or Côte d'Ivoire. If there is a difference between the younger and older cohorts, it is that the young tend to receive a larger wage return on their higher education than the older cohort, suggesting that the supply of university graduates has not yet caught up to the demand as of 1994, or possibly that the quality of higher education has improved over time.

Perhaps in response to the higher returns to women than to men at the secondary and higher educational levels, by 1994 women in Kenya were receiving almost as many years of schooling on average as men among the youngest generation.[12] Among Kenyans of an earlier generation (age 50-54), women had only a third as many years of schooling as had men, 1.4 compared to 4.2. (See Figure 3.) This apparently rapid advance in female education relative to male is probably contributing to the increased rate of migration of women from rural to urban areas and to the sharp decline in Kenyan fertility documented in the last decade. These factors placed Kenya among the first sub-Saharan countries to progress rapidly into its demographic transition, along with Botswana, Zimbabwe, and perhaps Senegal (National Research Council, 1993).

In 1993, the Project for Statistics on Living Standards and Development collected a representative household survey for South Africa from which Figure 4 is derived. More than three quarters of the population age 16-65 is Black African, 8% of mixed race or "colored," 3% of Indian descent, and 14% White. Table 5 reports the log wage function coefficients on the highest categories of education completed by workers, stratified for the two largest groups, Africans and Whites, whereas the smaller groups of mixed race and Indian exhibited intermediate levels of schooling and wage returns to schooling.

Table 1: Log Wage Function Estimates for Ghana in 1987, 1988, 1991, and 1998

	Years of	1987		1988		1991		1998	
	Schooling	Male	Female	Male	Female	Male	Female	Male	Female
Regression Coefficients *(Omitted category is no schooling)									
Some primary	4	.289	.203	.219	.389	.241	.303	.337	.098
Middle certificate	10	.574	.160	.477	.640	.563	.437	.615	.390
Secondary certificate	15	1.135	.334	1.054	1.224	1.063	.834	1.107	1.148
Commercial/vocational	5-12	.520	256	.380	.733	.960	.316	.875	.774
Teacher/nurse/ Technical certificate	17	1.297	1.087	1.304	1.464	1.555	1.448.	1391	1.400
University	19	1.701	1.409	1.779	1.398	1.778	1.721	2.098	1.143
Rural resident	B	-.521	-.557	-.348	-.596	-.357	-.484	-.469	-.461
R^2	B	.138	.080	.117	.111	.180	.152	.181	.133
Mean of dependent variable (log hourly wage)		3.40	3.19	3.46	3.16	4.44	4.26	6.06	5.81
(Standard deviation)		(1.19)	(1.36)	(1.21)	(1.42)	(.991)	(1.09)	(1.15)	(1.15)
Sample size		1555	1444	1715	1617	1989	1878	2669	2788
Implied Private Rate of Return in Percent per Annum									
(Primary-none)	4	7.2	5.1	5.5	9.7	6.0	7.6	8.4	2.5
(Middle-primary)	6	4.8	-.7	4.3	4.2	5.4	2.2	4.6	4.9
(Secondary-middle)	5	11.	2.6	12.	12.	10.	8.0	9.8	15.
(UniversityBsecondary)	4	14.	27.	18.	4.4	18.	22.	25.	0

*Also includes postschooling experience and experience squared

Table 2: Log Wage Function Estimates for Ghana, 1987 and 1998

	Years of Schooling	1987				1998			
		Age 25-34		Age 35-54		Age 25-34		Age 35-54	
		Male	Female	Male	Female	Male	Female	Male	Female
Regression Coefficients *(Omitted category is no schooling)									
Some Primary	4	.359	.249	.261	.250	.425	.301	.311	-.114
Middle certificate	10	.585	.412	.615	.132	.660	.502	.625	.175
Secondary certificate	15	1.321	.815	1.160	1.041	1.243	1.178	1.073	.991
Commercial/vocational	5-12	.832	.615	.357	.247	.849	.758	.905	.584
Teacher/Nurse/ Technical certificate	17	1.567	1.487	1.173	1.147	1.392	1.534	1.413	1.125
University	19	2.268	2.973	1.449	1.289	3.022	2.191	1.861	.203
Rural Resident	B	-.533	-.364	-.513	-.740	-.537	-.476	-.435	-.448
R^2	B	.125	.057	.151	.104	.164	.123	.190	.150
Mean of Dependent Variable (log hourly wage)		3.31	3.30	3.48	3.09	5.99	5.76	6.10	5.84
(Standard Deviation)		(1.20)	(1.35)	(1.18)	(1.36)	(1.12)	(1.11)	(1.17)	(1.37)
Sample Size		672	676	883	768	938	1132	1731	1656
Implied Private Rate of Return in Percent per Annum									
(Primary B None)	4	9.0	6.2	6.5	6.3	11.	7.5	7.8	-2.9
(Middle B Primary)	6	3.8	2.7	5.9	-2.0	3.9	3.4	5.2	4.8
(Secondary B middle)	5	15.	8.1	9.9	18.	12.	14.	9.0	16.
(University B Secondary)	4	24.	54.	5.8	6.2	44.	25.	20.	-20.

*Also includes postschooling experience and experience squared

Figure 2. Years of Schooling Completed in Côte d'Ivoire by Age in 1985: Males and Females.

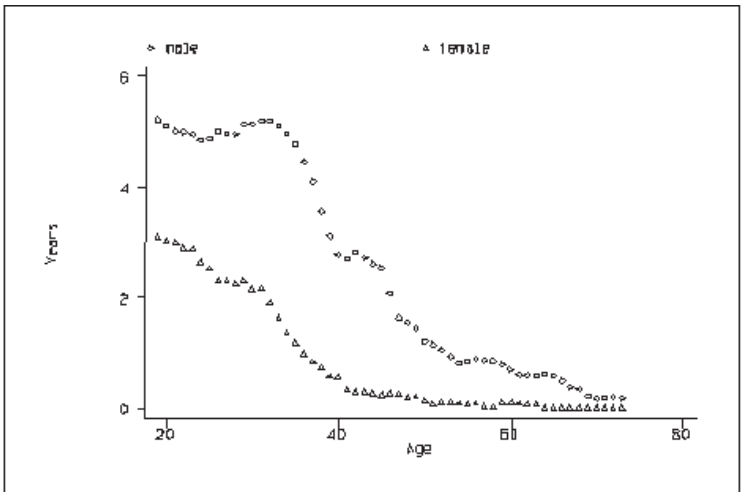


Figure 3. Years of Schooling Completed in Kenya by Age in 1994: Males and Females.

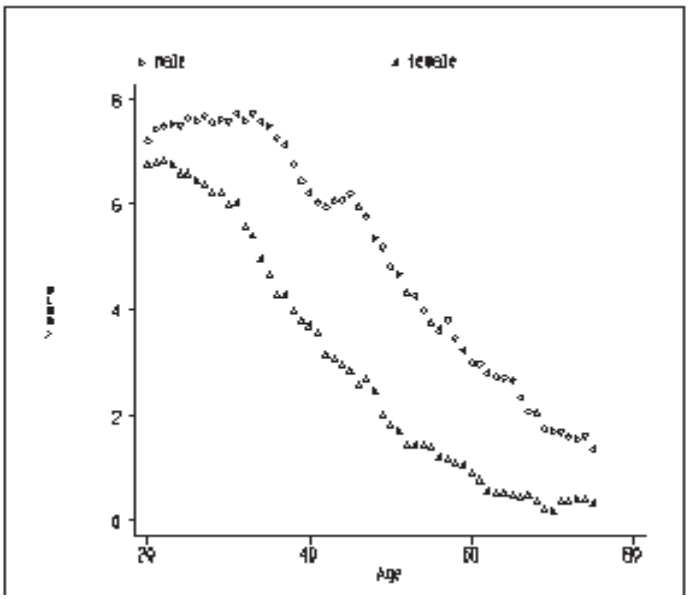


Table 3: Log Wage Function Estimates for Côte d'Ivoire in 1985–1987

	Years of Schooling	*Age 25-34*		*Age 35-54*	
		Male	*Female*	*Male*	*Female*
Regression Coefficients *(omitted category is "no schooling")					
Some Primary	4	.342	.353	.483	.674
Primary certificate	6	.920	.270	1.043	.624
Middle certificate	10	1.474	.653	1.502	.775
Secondary certificate	12	1.903	.887	2.013	1.333
Tech & professional	6-11	.338	.201	.185	.590
University	17	2.703	1.069	2.191	2.754
Rural resident	B	-.479	-1.21	-.718	-1.35
R^2	B	.389	.332	.353	.270
Mean of dependent Variable					
(log hourly wage)		5.71	5.10	5.63	4.73
(Standard deviation)		(2.14)	(2.79)	(2.11)	(2.96)
Sample size		867	666	1355	928
Implied Private Rate of Return in Percent per Annum					
(Primary-none)	6	15	4.5	17.0	10.0
(Middle-primary)	4	14	9.6	12.0	3.8
(Secondary-middle)	2	22	12.0	26.0	28.0
(University-secondary)	5	16	3.6	3.6	28.0

*Also includes postschooling experience and experience squared

The implied private wage returns to higher education are nearly twice as high for Africans as they are for Whites, and returns are highest for those with higher education within each distinguished race and age group, and for both sexes (Mwabu & Schultz 2000). One simple explanation for the high returns to secondary and post-secondary education for Africans is that the number of Africans who have been able to attain these levels of education has been restricted or politically rationed by the previous government. For example, only 2% of African men and 5% of African women ages 45-65 had any higher education. Even among the youngest age group (16-29), the fractions of African men and women with any higher education was only 5% and 12%, respectively. In contrast, 34% of White men and 25% of White women ages 45-65 had some higher education, with the fraction rising among younger Whites. The roughly 10 times larger proportion of Whites than Africans with higher education is one factor

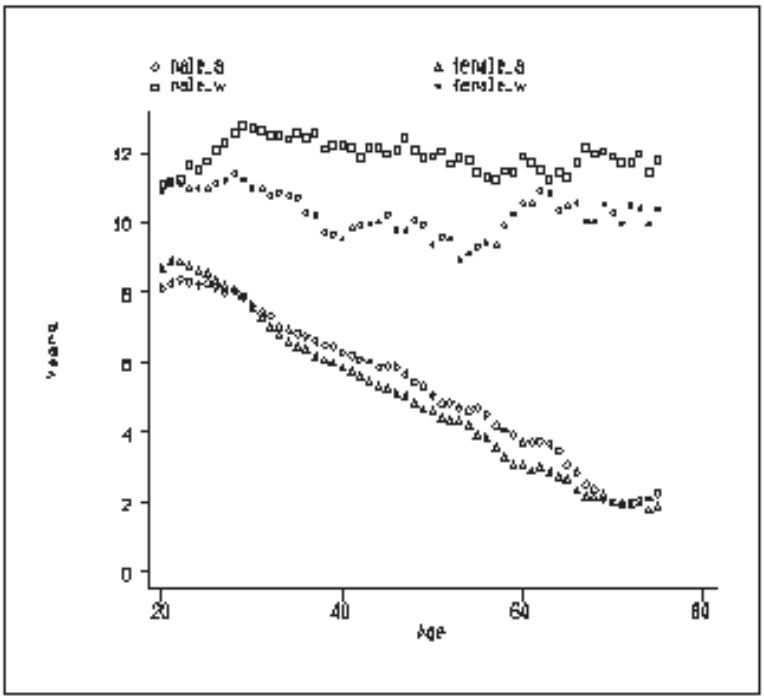
Table 4: Log Wage Function Estimates for Kenya in 1994, by Age and Gender

	Years of Schooling	*Age 25–34*		*Age 35–54*	
		Male	*Female*	*Male*	*Female*
Regression Coefficients *(omitted category is "no schooling")					
Some primary	6	.574	.561	.584	.138
Middle certificate	8	.857	.651	.814	.462
Secondary certificate	12	1.151	1.397	1.279	1.206
Vocational/tech	10-14	1.531	1.772	1.507	1.580
University	16	1.983	2.452	1.784	1.858
Rural resident	B	-.603	-.943	-.681	-.901
R^2	B	.151	.193	.208	.167
Mean of dependent variable (log hourly wage)		2.27	1.51	2.22	1.45
(Standard deviation)		(1.17)	(1.32)	(1.26)	(1.29)
Sample size		2625	2290	3401	2210
Implied Private Wage Returns in Percent per Annum					
(Middle-none)	8	11.	8.1	10.	5.8
(Secondary-middle)	4	7.4	20.	12.	19.
(University-secondary)	4	21.	26.	13	16

*Also includes postschooling experience and experience squared.

lowering the return to higher education among the Whites compared with Africans. African wage returns are also higher for the younger groups, suggesting that the imbalance between supply and demand increased in the last years of the apartheid regime, with the wages of Africans ages 25-34 being nearly a third higher (32%) for men who had an additional year of higher education and higher by almost half (46%) for women. The political rationing of advancement of Africans into the higher education system generated both an inequitable distribution of schooling (see Figure 4) and an inefficient allocation of resources from a perspective of private returns. This pattern of returns underscores the urgent need in South Africa to expand access to higher education for non-Whites who were previously rationed out of the system, as well as to merge and equalize the quality or public resources spent per student, regardless of race.

Figure 4: Years of Schooling Completed in South Africa by Age in 1993: Africans and Whites by Gender



Who Benefits from Subsidized Higher Education?

Some aspects of the personal distribution of educational opportunity in Africa are suggested by a cross tabulation of information available only from the 1985-1989 Living Standard Surveys from Ghana and Côte d'Ivoire, which asked about the education of the mother and father of all household members. The measure of higher educational opportunity examined here is the likelihood that a person received some higher education. It is calculated for all persons enumerated in the surveys collected in the late 1980s and is thus restricted to those in a birth cohort who survived to this period and did not emigrate to another country.

Table 6 reports that 1.8% of the males age 55 or over in Ghana had some higher education, whereas that fraction increased more than fourfold, to 8.8%,

among those ages 35 to 44, and then fell back to 6.7% in the subsequent youngest group (25 to 34). Females have also experienced a large increase in their receipt of higher education in Ghana, but their likelihood of attending higher education was only about a quarter that of males. This schooling difference between men and women is widely evident in most parts of sub-Saharan Africa, with the prominent exception of South Africa, and was diminishing in Kenya by the late 1990s. (See Figures 1-4; Mwabu & Schultz, 2000; Schultz 1995). Among males in Ghana age 55 and over, those whose father had some secondary schooling had a 40% chance of higher education, 22 times the national average, and 33 times that of a male whose father had no schooling. (See Table 6.) Those older males with a mother who had some secondary school achieved higher education 67 times more frequently than those with a mother who had no schooling. These indications of extreme intergenerational inequality of educational attainment diminished for the younger males, as education became more widespread, but still remains unequal. Among those aged 25 to 34, the likelihood of continuing to higher education was about four times greater for those with a father with some secondary school than for those with a father with no schooling, and seven time greater if one's mother had this advantage in schooling. The intergenerational educational mobility for female respondents is even more unequal than for males, just as the overall levels of education are lower for females than for males.

Until the 1970s, the educational system reached a smaller fraction of the population in Côte d'Ivoire than in Ghana, but thereafter higher education was obtained by nearly twice the share of males in Côte d'Ivoire as in Ghana, or 11% of those age 25–34, while 2.8% of females of this age had reached higher education.[13]

Women in Côte d'Ivoire attained higher education only one-fourth as often as men, but even this gender share was an improvement for younger women compared with older women. The relatively rapid economic growth of Côte d'Ivoire until the 1980s was mirrored in its rapid expansion of the educational system at all levels, which contrasts with the decline in Ghana. However, the educational intergenerational mobility of the two countries appears to be of roughly the same order of magnitude. Among males or females aged 45–54, the likelihood of attaining higher education in Côte d'Ivoire is 25 times larger if one's father had some secondary schooling than if he had none, and 50 times larger if one's mother had this same educational advantage. These ratios of the likelihood of receiving higher education conditioned upon the education of one's father declined in Côte d'Ivoire to 3.5 for males aged 25–34; based on one's mother's education, they declined to 7.4. There are too few older women

with any higher education in the survey to assess longer-term trends for women in Côte d'Ivoire, but for those aged 25–44, the ratio of the probability that women will receive some higher education if their fathers had some secondary schooling to that of women whose fathers had no schooling is about 40 to 1—even more unequal than for males of the same age.

These indicators of intergenerational mobility confirm what observers have widely suspected and criticized (Colclough 1997; Kimalu et al. 2001; King, 1997; Psacharapoulos & Woodhall 1985). Higher education, which is predominantly public in Africa, has absorbed relatively large public subsidies per student year, often without charging any student fees; and in some cases, such as in Côte d'Ivoire, academically qualifying students are provided with living stipends. The resulting large public transfers made to students enrolled in higher education benefit predominantly those families who were relatively well educated in the past. According to the wage functions reported earlier, these well-educated parents receive, on average, relatively high wage rates and are disproportionately at the top of the income distribution. As shown earlier, the private wage returns to higher education are large, rewarding generously the families who can obtain this level of schooling for their children. Without systematic efforts to help the poor prepare to qualify for, and to enroll in, higher education, the maintenance of the institutions underlying the status quo will contribute to sustaining the substantial economic inequality present today in Africa, if not continuing to make it progressively more unequal in the future.

What policy alternatives might reduce these undesirable distributional consequences of the African system of higher education? The challenge is to find a self-sustaining source of revenues on which to anchor an expansion of higher education, while at the same time reducing the concentration of "rents" generated by the current system of higher education in the hands of the wealthiest elites.

Policies to Improve Distributional Consequences of Educational Subsidies

Changing the personal distribution of benefits of higher education can be facilitated by a variety of pricing, transfer, and regulatory policies, and perhaps by changing the mix and location of educational institutions in Africa. Some of these changes might also improve the efficiency with which the public educational sector currently operates. Student loans, quotas, and targeted subsidies are all conventional methods to deal with the distributional problem described here, and they have been tried in different contexts with mixed success (Albrecht & Ziderman 1991; Colclough 1997; Johnstone 1992; Tilak 1997). Which of these approaches holds the greatest promise for Africa?

Table 5: Log Wage Function Estimates of Returns to Years of Schooling by Level in South Africa in 1993, by Race, and Gender

	Years of Schooling	Africans				Whites			
		25-34		35-54		25-34		35-54	
		Male	Female	Male	Female	Male	Female	Male	Female
Regression Coefficients (omitted category is "no schooling")									
Some	6-8	.293	.348	.465	.636	.083	.309	.734	-.246
Junior secondary	10	.728	.986	.872	1.291	.142	-.345	.195	-.315
Secondary	12	1.184	1.614	1.245	1.869	.546	.215	.668	-.069
Teacher/nurse/technical certificate	12-14	1.819	2.510	1.752	2.553	.870	.337	.793	.281
University	16	2.448	3.438	2.389	2.908	1.365	.713	1.137	.488
Rural	B	-.476	-.339	-.555	-.394	-.227	-.461	-.040	-.031
R^2	B	.360	.450	.346	.469	.247	.204	.151	.249
Mean of dependent variable (log hourly wage)		1.46	1.12	1.53	1.08	3.19	2.75	3.41	2.79
(Standard deviation)		(.890)	(1.09)	(.979)	(1.07)	(.598)	(.612)	(.746)	(.526)
Sample size		850	541	1115	767	214	192	317	541
Implied Private Rate of Return in Percent per Annum									
Junior secondary-none	10	7.3	9.6	8.8	13	1.4	-3.4	1.9	-3.1
Secondary-junior secondary	2	22.0	32.0	18.0	28.0	20.0	28.0	24.0	12.0
University-secondary	4	32.0	46.0	29.0	26.0	20.0	12.0	12.0	14.0

Note: The wage analyzed here is based on the sample for which the cash wage is positive and expressed as an hourly cash wage. A few additional individuals also report income in kind (food, housing, transportation, etc.). Summing these cash and in-kind income per hour leads to a wage with more outlying values that are less plausible, perhaps because the units of time, such as per day, leads to some large and some very small in-kind wage rates per hour.

Table 6: Proportion of Children with any Higher Education in Ghana and Côte d'Ivoire, by Child's Age, Sex, and Parents' Education

	Sons by Age				Daughters by Age			
Ghana (1985-87)	25 - 34	35 - 44	45 - 54	55+	25 - 34	35 - 44	45 - 54	55+
All persons	.067	.088	.048	.018	.018	.023	.010	.004
(sample size)	(1722)	(1188)	(876)	(1140)	(2205)	(1299)	(1077)	(1353)
Father's Highest Education								
None	.053	.061	.035	.012	.007	.010	.005	.002
Primary[a]	.091	.245	.095	.076	.041	.076	.028	.028
Secondary[a] or more	.238	.176	.462	.400œ	.083	.171	.143	.000œ
Mother's Highest Education								
None	.059	.077	.045	.015	.015	.014	.006	.002
Primary	.148	.295	.091	.091	.051	.154	.143	.103
Secondary or more	.417	1.00œ	1.00œ	1.00œ	.120	.455	.333œ	.000œ
Côte d'Ivoire (years)								
All persons	.111	.066	.022	.004	.028	.007	.002	.001
(sample size)	(2000)	(1301)	(1161)	(1535)	(2605)	(1835)	(1395)	(1405)
Father's Highest Education								
None	.085	.054	.017	.003	.009	.004	.001	.000
Primary[b]	.272	.170	.083	.000œ	.140	.077	.080	.143œ
Secondary[b] or more	.301	.304	.429œ	.667œ	.404	.150	.000œ	.000œ
Mother's Highest Education								
None	.105	.064	.020	.004	.020	.007	.002	.001
Primary	.257	.222œ	.000œ	~	.289	.000œ	.000œ	.000œ
Secondary or more	.778œ	1.00œ	1.00œ	~	.733	.333œ	~	~

The mean is based on a cell of less than 10 persons. Cell is empty[a]Primary and middle combined for first 10 years of primary, followed by five years of secondary. [b]Primary is six years and secondary is six years.

Given the survey evidence that private wage returns to higher education are substantial, it is not obvious why poor families do not invest more in the schooling of their children. One hypothesis is that the poor family and student are credit constrained, at least, when they want to invest in human capital, because human capital does not offer lenders a recoverable form of collateral in case of default, such as land for the farmer who borrows or business assets for the entrepreneur (Jacoby & Skoufias 1997). One solution to this problem is to offer students loans, which they could repay from their enhanced future earnings. A central student loan facility could hope to monitor the earnings of most workers with a higher education who predominantly work in the modern sector. Pooling a large number of loans to students with different abilities, specialties, and working in different labor markets, such a facility should be able to reduce the risk on its overall portfolio and thereby reduce the interest rates it must charge to self-finance future loans. This approach was first adopted at some private universities in high-income countries and then extended nationally by governments on the basis of established need to finance a fraction of the actual costs of higher education. The U.S. government has also been able to require income tax forms to validate parent and student incomes, thereby minimizing the opportunities for fraudulent default (Nerlove 1975).

Yet evaluations of a variety of student loan programs in low-income countries conclude that they have had serious problems, with sufficiently high default rates to not become self-sustaining. The cost of administration represents a large fraction of total program costs (Woodhall 1992). Kenya and Venezuela are cited as examples where repayment rates have been so low that it would have been cheaper for the government to have provided the higher education without fees (Colclough 1997: 77). Moreover, if university graduates become highly indebted to a state loan program, this situation might encourage emigration as a means of escaping the burden of repayment, thus exacerbating the problem of brain drain. Pressure to institute restrictions on the emigration of citizens with higher education could then follow (Bhagwati & Partington, 1976). The Soviet Union, for example, allowed its citizens to emigrate to Israel, but only after they repaid the state for the cost of their professional training.

India has used quotas to achieve more representation in higher education from lower castes and tribes and to increase the fraction of women in political offices (Chattopadhay & Duflo 2001). Although admission quotas may achieve a redistribution of the benefits of higher education, they are likely to also create a lower quality of schooling for the groups assigned minimum quotas. If the quota is not based on a readily monitored characteristic such as sex, caste, or race, how would it be administered? Ethnic and language groups might be identified which had below-average educational attainment, according to a

population census, and individuals from these disadvantaged groups could then be assigned a compensating upward adjustment in their rankings for fellowships and for admission into institutions of higher education. Although such a policy might have appeal for its transparency, it could also have undesirable political consequences in a country where ethnic conflicts are already a serious source of social friction.

What would constitute a satisfactory index of economic need on which to target transfers in order to redistribute the benefits of higher education? What readily verified information could be used to direct educational subsidies to the educationally disadvantaged which would not encourage counterproductive forms of behavior? The survey data presented earlier for Ghana and Côte d'Ivoire suggest that parent education would be one such basis for identifying those differentially represented in higher education. This criterion for an educational subsidy would not have a marked disincentive effect on effort, labor supply, or market earnings. In addition, a government agency would presumably find it easier to monitor than current income or parental wealth.

Geographical targeting should also be easy to administer and relatively efficient. The income and education gaps between rural and urban populations are generally larger in low-income countries than in high-income countries where economies are more integrated and labor mobility is higher. Tables 1 through 5 illustrate from survey estimates of wage structures that wages are substantially lower in rural areas, even after controlling for the worker's schooling, age, and sex. Wage rates are between 30% and 43% lower in Ghana, 38% and 75% lower in Côte d'Ivoire, 45% to 61% lower in Kenya, and 30% to 33% lower for Africans in South Africa.[14] Per capita household expenditures could be estimated from a national household survey to further identify the relative poverty of different regions or provinces of a country and to adjust the subsidy amounts that might be provided to help families whose children could enroll in higher education.

Between a fourth and a third of the variation in educational attainments across individuals in Ghana and Côte d'Ivoire can be accounted for by a three-way geographic distinction (rural/capital city/other urban), parent schooling, and age, as illustrated by the regressions in Table 7. For example, in Côte d'Ivoire the average education of a male in Abidjan is four years greater than in the rural areas. The national average for males ages 25 to 54 is 3.8 years of schooling. Having a father with eight years of education versus a father with no schooling is associated in this simple multi-variate regression with an extra advantage in education of 4 years (i.e., .521 * 8 = 4.2). A targeted educational subsidy for children from rural poor areas with less educated parents, as guided by simple

relationships such as those reported in Table 7, could be financed by increasing regular tuitions and fees for students currently enrolled in public higher education. As discussed in the next section, increased student fees could not only help to finance the redistribution of benefits from higher education toward the poor, but it could also have a number of other consequences for the governance and probably the efficiency and equity of higher education in Africa.

Table 7: Schooling Attainment of Persons Aged 25–54 Fitted to Geographic Areas and Parents' Schooling

	Ghana 1987–88		Côte d'Ivoire 1987–89	
	Male	Female	Male	Female
Regression Coefficients[a]				
Rural (other urban omitted category)	-2.94 (16.0)	-1.86 (14.0)	-2.79 (18.0)	-9.07 (10.9)
Capital city	1.54 (6.09)	1.66 (8.57)	1.24 (6.98)	(13.) .333
Mother's schooling years	.130 (3.04)	.294 (10.4)	.233 (2.35)	.333 (6.67)
Father's schooling years	.300 (13.0)	.318 (20.0)	.521 (16.0)	.615 (29.0)
Age years	.400 (4.81)	.161 (4.14)	.300 (4.07)	-1.90 (4.90)
Age squared/100	-.746 (5.89)	-.373 (4.14)	-.541 (5.66)	.158 (3.14)
R^2	.234	.343	.311	.369
Sample size	3643	4419	4451	5838
Mean of schooling years	7.16	3.80	3.77	1.29
(Standard deviation)	(5.64)	(4.91)	(5.01)	(3.15)

[a]Also included dummies for year of survey and whether the education of the mother or father is missing, in which case the parent's education is set equal to the mean of parents reporting in the sample.

A variety of low-income countries have, in the last decade, implemented human capital incentive programs to encourage household demand for more education, and these programs could be productively adapted to African circumstances. Bangladesh introduced a secondary school scholarship program for girls, which placed the scholarship in a bank account for the girl, contingent on her not marrying before age 18. Other government programs, restricted to poor families, transferred food allotments (wheat) to each family if their children attended school 85% of the days in the session (Arends-Kuenning & Amin

2000). In South and Central Mexico, transfers to the rural poor began in the fall of 1998. By the end of 2000, 3 million families residing in small, very poor, villages were eligible to receive school and food subsidies through a program called "Progresa." The program seeks to increase the school enrollment of children from poor families by giving grants to mothers whose children are enrolled in grades three through nine and who attended 85% of the time. The size of the transfer payment increases with the child's grade level to approximate what a child could earn by working rather than going to school and raises consumption levels in eligible households by about one fifth (Schultz 2001). Three states in Brazil have experimented for several years with school enrollment bonuses for poor families, and the federal government enacted legislation in 2001 to extend these programs to the poor throughout the country (Sedlacek 2001).

These means-based educational subsidy programs require methodical planning and careful monitoring to achieve their objectives of redistributing human capital, but they hold the promise of alleviating poverty and encouraging productive human capital investment among the poor. An evaluation of the effectiveness of the Progresa program to reduce family income-differentials in enrollment rates suggests that these direct subsidies for child education (and nutrition/health) are reducing poverty and inequality in Mexico. These programs may prove more effective in reaching disadvantaged children than traditional public expenditure programs which add to the public *supply* of services, by building more schools (health clinics) or expending more on school (clinic) quality (Schultz 2001).

Africa should be encouraged to experiment in the design of higher education subsidy programs targeted to the children of the poor and to rigorously evaluate the consequences of such social welfare experiments. A program in higher education would also need to include support for secondary school students from disadvantaged backgrounds to augment the pool of secondary school graduates who could qualify for higher education. These household-demand subsidies for public education and health programs could help Africa avoid creating the extreme patterns of economic inequality that have a persistent grip on Latin America today. What constructive role could private education play in this process?

Private and Public Higher Education and Governance

Private institutions may help produce the trained workforce that the estimated wage functions suggest are demanded today in Africa. Governments should not unnecessarily restrict them from entry into higher education. Some courses of study may be more suitable than others for the private sector. From the U.S.

experience, vocational, apprenticeships, and some professional programs appear to be more successful in the private than in the public sector. This is perhaps because the vocational knowledge they transmit to their trainees varies over time, as the skills that are in short supply to private firms will change. Private groups appear to be more flexible and responsive to such evolving market scarcities than public agencies. In particular, the public sector may be restricted by civil service regulations and personnel policies that limit its capacity to hire, advance, and fire employees, traits that may be essential to flexibly provide the training programs that are privately demanded and to effectively use new technologies such as the Internet.

Private sector training organizations will need to charge students the full costs for training and thereby set a competitive market price which should help the public sector adjust its own structure of fees and tuition. Any excess demand for admissions in the subsidized public sector institutions of higher education can then spill over into the private sector; and those desiring it may acquire vocational training, even if they cannot qualify for admittance into the major public institutions. Although the development of private training organizations may create a lower-quality tier of private schools catering to the upper middle classes, as they have in some other low- and high-income countries, such a measure should help to prepare the way for more competitive public tuitions and fees. Examples might be found in terms of business, accounting and secretarial schools, and technical skills relevant to the installation and use of new information technologies, where the government might retain a role of administering proficiency examinations to set some standards on the quality of training individuals receive in the private and public sectors.

The reallocation of public sector resources to the traditional areas of academic and professional training might be an appropriate consequence of the expansion of private training. These forms of specialization between private and public institutions could lead to expanding programs in the physical and biological sciences and engineering, preserving core studies in mathematics and statistics, social sciences, and key fields of the humanities. Such a measure would be justified in part by the size of self-financing enrollments. With the increase in fees, students would also have stronger incentives to complete their studies more quickly. Independently administered exams for professional competency could further encourage competition between private and public training institutions.

Those professions which are employed mostly by the public sector, such as teachers, nurses, and agricultural extension workers, may be emphasized in the mix of programs in the public sector higher educational system. Increasing the number and quality of graduates from these programs should benefit the public

sector by its supply effect in reducing the wages which the public sector should pay in the future for its personnel. This argument for the public training of teachers, nurses, etc., may be valid if the labor market institutions surrounding public employment are competitive and if the public sector regularly evaluates its employees and does not renew contracts with those who are not doing an adequate job. Conversely, if these public sector teaching appointments are implicitly made for a lifetime and are not contingent on monitoring and work incentives, the public may not gain from increasing the supply of teachers. Rather the consequence may be smaller class sizes, which may be primarily an amenity for teachers and not an efficient use of public educational resources (e.g., Kimalu et al. 2001). There is surprisingly little evidence that reducing classroom size below 30–40 at secondary school level enhances the performance of students, nor have I seen evidence on this issue at the level of higher education.

Increasing immigration to other countries in the region or to high-income countries signals that individuals in a particular career or professional occupation are domestically in generous supply in the national economy. Before increasing the public training in such areas of brain drain, a careful review of the conditions of employment and training in the country may identify other constraints and regulations that might be modified to make domestic employment in the field more attractive and competitive to those abroad. Clearly some of the skills needed are those for which there are good jobs abroad; and retaining top scientists, doctors, and engineers will be perennial problems for low-income countries. Higher education has, as a major challenge, restructuring its hiring and advancement policies to reward performance, thus enabling it to compete for a few of the best faculty in critical fields. As long as public institutions of higher education are regulated by civil servant pay scales and hiring regulations, these institutions will be disadvantaged in getting and keeping the most talented or the hardest working faculty.

This topic raises the complex issue of administration and governance of higher educational institutions. They must be responsible to the government and to the public through transparent financial and output records. Yet they also must establish distinctive methods of decentralized budgeting, personnel management practices, and incentives to motivate individuals to perform their individual roles and cooperate in the joint tasks which a complex educational system requires. Governing boards of higher educational institutions should be insulated from government interventions, but they must nonetheless be responsible to the public. This requires the development of special institutions adapted to the complexities of higher education as well as to local conditions.

Transparency of finances is essential, but to gain control of setting their own priorities, these institutions should decide how to allocate their own revenue fees, subject to periodic public audits and review. There has been cogent criticism for many years of the practice of setting fees for higher education too low, which leads to "excess demand" for university admissions which tends to favor the upper middle income classes. Korea, for example is reported to spend 3.5% of its GNP on primary and secondary education, striving to equalize its quality across regions, while parents spend almost as much on tutoring to purchase an advantage for their children in gaining admission to the prestigious public universities which are free (Kim & Lee 2001).

Yet the political pressures from the groups that are favored by the current system of "free" universities in Africa lobby effectively with the politicians to prevent the universities from raising their fees to recover a more substantial share of the public costs of higher education. As a consequence, university faculty are confronted with growing class sizes and decreasing support for training infrastructure such as laboratories, computers, and libraries, as well as decreasing real salaries in many settings. Faculty are forced to take on additional teaching jobs, limiting their capacity to perform research. This may be expected to lead them to teach their students outdated materials and diminish their effectiveness as instructors. Allowing for limited faculty self-governance without empowering professional societies or unions is no less important in low-income countries than it is in high-income countries.

But if higher education has a financial responsibility to use its fee revenues to create new programs, close unsuccessful ones, strengthen old ones, and introduce funds for incentive pay and performance standards for faculty, the marginal uses of funds could begin to remedy many of the common problems that have led to the weakening of some outstanding universities in Africa. The ability to allocate new user fees would give the higher educational governing boards a flexibility in responding to organizational problems that may be difficult to otherwise reform and to initiate new activities for which the social returns are arguably high. Decentralization in resource allocation and decision making should be encouraged, down to the department level or the research unit, with the governing board specifying and monitoring the desired outcomes (e.g., enrollments and quality of training). Selection of respected faculty by the permanent staff to serve on various levels of university management would also be desirable to maintain professional standards and reduce corruption.

Another of the long-standing organizational challenges facing higher education is to orient its research and training capacity to problems that have local social importance. One linkage that is often difficult to achieve is that between

private industry and university researchers. The industrial firm wants to control the knowledge and innovations it produces by patents and the like, whereas the university faculty wants to publish their research findings to add to the base of knowledge which is recognized by their world community of scientific peers. These tensions have their obvious counterpart in high-income countries. Low-income countries should strive to create an environment where private firms and university researchers can pool resources to their mutual benefit and where public interests are likely to be served in the exchange.

Creating an intermediate-level research center which could be allied to a university but remain financially independent might provide a mechanism for rewarding research-oriented faculty with a supplemental salary, research laboratories, and justified research expenses, while leaving intact the more homogeneous compensation scales for faculty who perform teaching functions. For example, some universities in the United States have separate coordinated institutions which help in the recruitment of outstanding scientists and scholars, offering a supplemental salary to research faculty on competitively renewable terms of appointment.

Tentative Conclusions

Empirical evidence has been assembled from household surveys collected from 1985 to 1998 in four African countries. In the cases of Ghana, Côte d'Ivoire, Kenya, and South Africa, workers are receiving higher wages to compensate them for having enrolled in higher education. The wage gains associated with each year of higher education completed range from 10–20%, if one excludes the extraordinary wage returns of Africans in South Africa which are probably due to the "unnatural experiment" of apartheid that restricted the supply of non-Whites in higher education. These private rates of return to higher education are relatively attractive by world standards, suggesting that private individuals in Africa currently have a strong financial incentive to acquire more higher education.

If there are external benefits to higher education accruing to others in society than the students and their families, these social external returns need to be documented. I realize that this task is daunting and controversial, but the analyses of the private wage returns to higher education reported here should in the future be extended to include public costs of providing the education, and then include the value of externalities. In my opinion, private wage returns to schooling in a low-income country should not be dismissed because they are incomplete or imperfect. An alternative scheme for evaluating higher education may be needed, because of its complexity, but it should involve standard cost-ef-

fectiveness arguments. Eventually an open political system will need to offer cogent criteria for setting program priorities within public higher education. There are many who are unsatisfied with the economic approach, but developing a superior methodology will require building on the scheme outlined here.

Although in some African countries, such as Kenya, women have made great advances in general education, the gender gap in schooling remains large in Côte d'Ivoire and Ghana, although not recently evident in South Africa. Since there are persuasive reasons to think that educating more women will improve the health and schooling of their children, as well as reducing their fertility, such impacts of female education can be interpreted as a social externality justifying an extra social subsidy for female education. But these arguments for governments investing more in women's education may be more convincing at the basic primary and secondary school levels than at the level of higher education.

The major disadvantage in expanding public outlays on higher education under its current financial arrangements in Africa is that it benefits children who are mostly from upper economic classes, living in urban areas, whose parents are relatively well educated within their generation. In other words, the large public subsidies for higher education financially benefit predominantly the upper classes, contributing to future economic inequalities. Low intergenerational educational mobility is illustrated in two countries in Table 6. An assessment might show that Africa was no more inequitable than other low-income regions, such as Latin America or South Asia, with regard to tax-subsidy arrangements or educational mobility. (Compare King's 1997 study of Indonesia.)

Comparisons over time for China have illustrated powerfully how cycles of reform, like those that occurred in the wake of the Communist Revolution and again during the Cultural Revolution, have broken down the traditional replication of educational and occupational opportunities among elite families but at the cost of disrupting secondary and higher education (Tang & Parish 2000). The mechanisms I propose to redistribute the gains from higher education in Africa are less radical, involving the use of user taxes and targeted transfers. The approach is not unprecedented, as noted in Mexico, Brazil, and Bangladesh; but its focus on higher education in Africa would be distinctive. Subsidies for higher education or fellowships would be targeted to children from more disadvantaged families and would be financed by increased fees and tuition for other students in public higher educational institutions who are now heavily subsidized by the state. Moving toward self-financing of higher education through increased user fees could also ameliorate some of the counterproductive involvement of politicians in the day-to-day governance of higher educa-

tion and allow more leeway for decentralized faculty self-governance. Encouraging private institutions to offer higher educational courses of a more vocational form could also free public institutions to concentrate on core university programs of higher education, as well as those training programs which directly supply personnel to the government, such as teachers, nurses, and agricultural extension agents. Where research is clearly a major part of university training programs, additional resources might be provided, possibly through parallel research institutions which could offer funding on a competitive basis, to release faculty time to engage in research. These research funds could be allocated by peer review committees, in the form of short-term competitive grants, as financed in the United States by the National Institutes of Health and the National Science Foundations, among others.

Unless a mechanism is found for improving the personal distribution of the benefits of higher education, international development agencies, private foundations, or other nongovernment organizations may find it difficult to expand their support for public higher education in Africa. Basic education at the primary and secondary levels, programs favoring women's education, programs in preventive health, and HIV/AIDS education programs, may all command more broad-based public support than public higher education as currently organized in most countries.

Notes

1 The differences in worker productivity by schooling, age, and sex were first used by Denison (1962), Schultz (1961), and Kuznets (1966) to attribute part of modern economic growth to the changing composition of the labor force in the United States. The systematic conceptual and empirical analysis of the 1940 federal census cross tabulations of earnings data provided Becker (1964) with a basis for his calculation of an internal rate of return which would, over an individual's lifetime, equate the opportunity cost of obtaining schooling to the discounted value of lifetime wage gains. Jorgenson (1995) has continued to extend this approach to treat the implied human capital investments as a form of capital accumulation in his national income accounts for the United States.

2 Foster and Rosenzweig (1995) assess the potential benefits of new technological options by estimating for Indian agriculture the effects of educating farmers so that they adopt new higher-yielding varieties. They also estimate a spillover effect which a farmer realizes from having better-educated neighbors. They find a social exernality of education, but the effect is observed at the primary school level.

3 Moretti (1998) estimates external returns to education in the United States by comparing wages for otherwise similar individuals who work in cities with higher and lower average levels of education from 1980 to 1990, based on his selection of instrumental variables which help him endogenize the city's supply of educated

workers. He estimates that workers receive a 15% higher wage in a city which has workers with one year more average education. Unobserved heterogeneity in labor demand and supply is difficult to distinguish and control for in this analysis, but the analytical strategy might be applied to account for the interregional variation in wages in low-income countries and across countries. Less germane to the objectives of this paper is work by Jaffe, Trajtenberg, and Henderson (1993). Geographic localization of knowledge spillovers as evidenced by patent citation has found that citations to patents are more concentrated in the same state and Standard Metropolitan Statistical Areas (SMSA), suggesting that the diffusion of inventions is localized in the United States from 1975 to 1989, which could be interpreted as evidence of spillover effects from research and development activity that produces patents on new knowledge at the city level which benefit neighboring producers by reducing their costs.

4 Unfortunately many empirical studies of the effect of parent schooling on child development are flawed from the perspective of this analysis, because they control for variables that are themselves likely to be affected by parent schooling. A deeper understanding of the marriage market might sharpen our insights into some of these connections and how gender differences in parent schooling contribute to child development.

5 Easterly (2001) provides a recent recapitulation of some of the evidence from cross-country regressions of growth on changes in educational attainment, which do not always find a positive partial correlation. His view challenges the idea that education at the aggregate level contributes to growth as it appears at the individual worker level. Anomalous estimates of cross-country growth rates over time conditioned on changes over time in education may be partly explained by measurement error. Topel (1999) examines the specifications of some of these aggregate growth regressions and interprets the meaning of the empirical evidence in light of wage function estimates.

6 Schooling is mapped onto the instrumental variable in a first-stage analysis, and then this prediction of schooling based on the instrument is used to explain wages in a second-stage analysis, which under specified conditions will be corrected for omitted variable bias and for classical sources of measurement error embodied in the survey variable measuring schooling (Card, 1999). An early study of East Africa attempted to hold constant for test achievement to evaluate the residual relationship between schooling and wages (Boissiere et al., 1985).

7 For example, building local community colleges may increase higher education among children from poor rural families who experience higher than average returns since they are most credit constrained. Alternatively, public expenditures to improve the quality of higher education which have the effect of reducing class size at the elite universities in the capital city may increase the educational attainment of children from high-income families whose wage returns to more and better quality higher education is lower than average.

8 The problem of sample selection of wage earners has been discussed extensively and has guided many econometric efforts to correct for this potential source of bias in this specific context of estimating the returns to education. The existing evidence does not indicate that the sample selection bias systematically understates or overstates the estimated returns to schooling in low-income countries or that it differentially affects the returns to schooling for men or women, though of course it could potentially be more serious for women who are less often observed to be working in a wage job (Schultz, 1995). But the problem deserves careful evaluation in low-income countries where the fraction of wage earners is markedly lower than in high-income countries. The bias is probably moderated for the higher educated, since they predominantly work in the wage sector.

9 Other studies of the wage structure in Kenya and the consequences of the divergent paths taken by the educational systems in Kenya and Tanzania relied on data from the 1970s and often generalized from surveys of manufacturing firms for whom wage workers may not be particularly representative (Knight & Sabot 1981, 1990). The living standard survey of Tanzania collected in 1993 did not include hourly wage data for individuals.

10 In 1957 Ghana and Korea were reckoned to have approximately the same income per capita, comparing local currency GNP by means of foreign exchange rates. Ghana had the highest income level in West Africa at that time but experienced an economic growth rate during the next 25 years which was only slightly more rapid than its population growth. In contrast, Korea grew much faster in the 1960s and thereafter until the financial crisis of 1997 when its income level per capita was about tenfold greater than Ghana.

11 The Ghana Living Standards Survey (GLSS) retained a similar questionnaire and comparable sampling methods in the four rounds, although the World Bank participated in the initial two years, and the educational attainment question changed in the last year to emphasize certificates and degrees received rather than the years of schooling completed by level. The most comparable measures are used to construct consistent categories from all of the surveys which are included in Table 1.

12 My tabulations of the 1994 Kenyan Welfare Monitoring Survey II are shown in Figure 3.

13 These differences between Ghana and Côte d'Ivoire may be affected by immigration and thus may not reflect accurately the levels of educational attainment achieved by a sequence of birth cohorts in the two countries. It is likely that a larger fraction of higher educated individuals from Ghana than from Côte d'Ivoire left the countries during the 1960s and 1970s when growth was much lower in Ghana than Côte d'Ivoire, particularly those in such professions as medicine and engineering.

14 The coefficient on rural residence in the wage functions reported in Tables 1-5 is converted to a wage differential by exponentiating the coefficient and subtracting it from 1.0. This represents how large a proportion the rural wage is of the urban wage. For example, for Kenyan males aged 25-34 the rural wage is 55% of the urban, i.e., .55 = exp (-.603) or 45 below urban levels.

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Should There Be a General Subsidy for Higher Education in Developing Countries?[1]

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Abstract

The view that developing countries ought to offer general subsidies for higher education has many supporters. We use traditional economic logic to specify the conditions under which such an investment policy would promote a socially efficient allocation of resources. We identify three necessary conditions. First, the net social benefit from the investment must be positive. Second, private actors must have insufficient ability or incentive to undertake the socially optimal level of investment. Finally, the investment must generate more net social benefits than competing uses of public funds. We reason that the first condition is likely to be satisfied, the second might not, and third is even more questionable. Without empirical evidence to the contrary, we therefore reason that there is no clear-cut efficiency reason for a general subsidy for higher education in developing countries.

Résumé

Beaucoup sont d'avis que les pays développés doivent offrir des subventions globales pour soutenir l'enseignement supérieur. Nous nous servons de la traditionnelle logique économique pour spécifier les conditions selon lesquelles une telle politique d'investissement pourrait promouvoir une attribution de ressources adaptées sur le plan social. Nous avons identifié trois conditions préalables. Premièrement, le bénéfice social net provenant de ces

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investissements doit être positif. Deuxièmement, les acteurs privés ne doivent pas disposer des capacités nécessaires pour assurer un niveau d'investissement optimal sur le plan social. Enfin, les investissements doivent générer plus de bénéfices sociaux nets que les autres formes d'usage de fonds publics. Nous pensons que la première condition est susceptible d'être réalisée, la seconde l'est moins, et la troisième est encore plus incertaine. En l'absence de preuve empirique prouvant le contraire, nous affirmons donc qu'il n'y a pas de justification précise à l'octroi de subvention globale destinée à l'enseignement supérieur dans les pays en développement.

Introduction

In this note, we take up the following question: Should there be a general subsidy for higher education in developing countries, whereby state subsidies are provided to all those wishing to attend a higher education institution? In economic policy analysis, there are usually two objectives policy makers ought to promote: efficiency and equity. This approach allows us to break down our question into two smaller ones. Are there efficiency reasons for a general subsidy? Are there equity reasons? Most of those who argue for a general subsidy would probably agree that there is no strong equity reason for it. On average, college students in developing countries belong to the elite socioeconomic classes; hence, subsidizing their education would be regressive, at least relative to subsidizing primary and secondary schooling. For this reason, we focus mainly on the question of whether there are efficiency reasons for a general subsidy.

We rely exclusively on results of traditional economic theory to clarify the logic under which general subsidies would promote efficiency. In this sense, we develop no new theoretical arguments and mainly see our contribution as applying general economic principles to the analysis of a particular educational policy question.[2] If our reasoning is convincing, it provides support for conducting the empirical research required to assess whether the conditions that justify a general subsidy to higher education, in fact, hold.[3]

Taxonomy of Costs and Benefits

To address our question, it will help to look at higher education as an investment. For an economist, this means it is an activity that requires incurring costs in the short term to enjoy benefits that extend into the perhaps very distant future. Assessing whether an investment is worth making, therefore, requires comparing short-term costs and long-term benefits.

It is important to note that the costs and benefits of an investment are not limited to the individual who is considering it. An investment may also entail

costs and benefits for the rest of society. It is traditional to refer to the costs and benefits to the individual as "private," and those to the rest of society as "public."

In the case of investments in higher education, private costs include school tuition, fees, and other related expenses like transportation and books. They also include an opportunity cost: the income that an individual could have earned if he or she had decided to work instead of going to college. As to private benefits, economists have traditionally focused—perhaps too narrowly, as we argue below—on the trajectory of higher future wage rates that becomes possible because of a college education.

This appraisal does not exhaust all the costs and benefits of higher education. When an individual chooses to go to college, this decision also entails costs and benefits for the rest of society. In many countries, higher education is heavily subsidized by government revenues. This means that taxpayers bear part of the schooling costs of college students. On the other hand, investments in higher education may produce benefits to the rest of society over and above private benefits. These public benefits are commonly referred to as positive externalities. A critical mass of highly educated citizens can provide society with an informed citizenry and a larger pool of capable business and political leaders, scientists, and academics who augment society's stock of basic and applied science.

To recap this brief taxonomy, higher education can be thought of as an investment that has both costs and benefits. These may accrue both to the individuals and to households who make these investments, in which case they are private, and to the rest of society, in which case they are public. So a complete accounting of the costs and benefits associated with investments in higher education can be made using a table like Table 1.[4]

Table 1

Point of View	Benefits	Costs	Net Benefit
Private	Private benefits: lifetime earnings	Private costs: tuition, foregone income	Private net benefit
Public	Public benefits: externalities	Public costs: tuition subsidies	Public net benefit
Social	Social benefits	Social costs	Social net benefit

The third row of this table contains social costs and benefits, simply defined as the sum of private and public costs and benefits, and therefore represents the

overall benefits and costs experienced by society as a whole. Under the assumption that benefits and costs can be measured in the same units and appropriately discounted into present values, we can define "net benefit" as the difference between benefits and costs. It measures the advantages to the people concerned of the investment taking place.

Decision Rules

Given the above taxonomy of costs and benefits accruing to the different actors in society, let us now ask:

1. Under what conditions would private individuals choose to invest in higher education?
2. Under what conditions should the state encourage individuals to invest in higher education by subsidizing part or all of the costs?

Using our taxonomy, the first question, which asks when individuals ought to choose to go to college, is simple to answer. The individual ought to attend college if the net private benefit is positive. This decision rule is premised on economists' standard view of individuals as being self-interested. The only costs and benefits relevant to individual decision making are private ones. It is also premised on the assumption that the individual is not credit constrained. In other words, it assumes that any individual for whom higher education yields a net private benefit can borrow whatever money is necessary to finance the investment at reasonably competitive market rates. We discuss the implications of relaxing this assumption below in the section on "Credit Constraints."

The second question is, in fact, a restatement of our main question: Under what conditions should the state implement a general subsidy for higher education? We are ignoring equity considerations, so we assume that the state, as representative of society as a whole, cares only about producing the largest social net benefit and is indifferent to the distribution of this benefit. Under this assumption, the state would like the investment in higher education to occur if the social net benefit from doing so is positive. But this is not the same thing as saying that the state should take the action necessary to make this happen or that it should bear some of the costs of bringing this investment about. It could be that private individuals left to their own devices will make these socially beneficial investments without inducements from the state. The state should refrain from bearing the costs of socially desirable investments if these investments would take place anyway in the absence of state support. Thus, the state should bear the cost of investments if the following two *necessary* conditions hold:

Condition 1. The social net benefit from the investment is positive.
Condition 2. Private actors do not have sufficient incentive or ability to undertake the socially desirable level of investment themselves.

But are these two conditions *sufficient* to justify a general subsidy of higher education? Not necessarily. Developing country governments usually face many competing investment priorities that satisfy these two conditions. Primary and secondary school education, primary health care, HIV/AIDS prevention and treatment are some simple but compelling examples. Ideally, a government should undertake all such investments, but under the all-too-realistic assumption that it cannot, it ought to prioritize those that have the largest social net benefits. This gives us a third necessary condition:

Condition 3. It has the highest net social benefit among all competing investments for which the first two conditions are true.[5]

Thus, we have our full decision rule. The state should implement a general subsidy for higher education if Conditions 1–3 are true.

On Two Potential Arguments for a General Subsidy

Now we proceed to use our taxonomy and decision rules to evaluate arguments that proponents of a general subsidy have or could invoke in favor of it. We evaluate two arguments. The first is the existence of positive externalities. The second is the existence of credit-constrained individuals for whom the private net benefit of higher education is positive but who cannot afford it and who may benefit from the subsidy. To simplify the exposition, we shall discuss each argument separately. Thus, we will initially focus on externality arguments, assuming that credit constraints do not exist. We will then focus on credit constraints assuming away externalities. The coexistence of these problems in reality will not invalidate the reasoning used in analyzing each problem separately.

The Role of Externalities

Many people have argued that a strong efficiency reason for the state to bear some of the costs of higher education is the existence of positive externalities.[6] We can now use our taxonomy and decision rules to examine the circumstances under which this view makes sense. As we have said, externalities are a kind of public benefit. The larger the public benefits, the larger the over-all social benefits. Thus, the existence of positive externalities is more likely to make Condition 1 true.

The presence of externalities produces larger net social benefits without producing larger net private benefits. This implies that the larger the externalities, the larger the potential gap between optimal investments from the private and social points of view. So the existence of positive externalities may make Condition 2 true. But traditional economic reasoning tells us that what is also needed for Condition 2 to be true is for individuals' schooling decisions to be relatively responsive to the costs of higher education, or in economists' language, for the demand for a college education to be price elastic. It is a combination of the existence of positive externalities and elastic demand that makes Condition 2 likely.

To see this, consider the case where demand for education is inelastic, or unresponsive to costs. The most likely reason for this to occur would be for people to so strongly value the benefits of higher education that reasonable variations in its costs do not dissuade them from investing in it. Under these conditions, subsidies are ineffective as an inducement to investing in college, since people would have made the investment in the absence of the subsidy anyway. Since people receiving the subsidy do not alter their behavior in response to it, the subsidy effectively becomes a resource transfer to them. Whether positive externalities exist or not does not alter the futility of the policy as an inducement for behavioral change when demand is inelastic. On the other hand, when demand is elastic, whether people go to school or not is sensitive to the costs of schooling. This is likely to be true when incentives to go to school are not especially strong and can be affected by moderate variations in school costs. It is when these incentives are not especially strong that private individuals may end up investing in less schooling than is best from society's point of view. Hence, elastic demand makes Condition 2 more likely.

Elastic demand also creates conditions for an effective subsidy, since small subsidies that lower costs could produce significant inducements for these people to go to school. In sum, while positive externalities may make Condition 2 more likely, one has to also assume that demand is sufficiently elastic for this to be the case. Under these conditions, the state could implement a general subsidy that would result in lower private costs, and therefore higher net private benefits. The general subsidy would serve to align private interests with public ones. In other words, individuals would invest and earn the private benefits, and the rest of society would bear some of the costs of this investment but enjoy the positive externalities. The importance of the elasticity of the demand for higher education makes empirical estimation of this magnitude a research priority.[7]

It may be interesting to estimate the elasticity of demand directly using individual survey data to examine the effect on school enrollment decisions of schooling costs. If we find that among noncredit constrained individuals, schooling decisions tend to be sensitive to price, then the existence of positive exter-

nalities would be more likely to make Condition 2 true, as advocates of a general subsidy would argue.

In this connection, it would also be interesting to account for variations in educational quality. If colleges vary in the quality of the education they offer, and if higher quality schools are more costly, then individuals' demand for quality may be elastic, even if the demand to go to school is not. A student may be willing to go to a lower-quality college if it is cheaper. In this case, variations in the cost of schooling may not affect whether an individual goes to college, but such variations may affect whether that individual goes to a good school or a bad one. If a high-quality education yields more positive externalities than a low-quality education, then while a general subsidy might not increase the number of people going to college, it may raise the proportion of college students who go to high-quality institutions and, therefore, the amount of positive externalities they produce.

Paul Schultz, however, makes a second point: that those who argue for the existence of positive externalities have no convincing empirical evidence for them. This observation implies that, although the net social benefits from higher education are positive, this condition is probably mainly due to the size of the private benefits, rather than public ones. And if there are no positive externalities, the elasticity of demand for higher education is irrelevant since there would be nothing gained, from the point of view of the rest of society, from inducing more people to go to college.

Thus, it seems that Condition 2 highlights two empirical tasks that must be borne by advocates of general subsidies. First, they must demonstrate the existence and relevance of positive externalities. Second, they must show sufficient elasticity either in the demand for higher education or in the demand for quality in higher education, and they must show that high-quality education yields larger externalities than low-quality education.

The last hurdle is Condition 3. It implies that a general subsidy would not be justified even if one could show that externalities exist, that demands are elastic, and that the quality of education affects the size of externalities. This condition also requires proof that the net social benefits are large relative to alternative investments satisfying Condition 1 and Condition 2. To do so is a tall order. We have already emphasized the absence of direct empirical data that renders the fulfillment of Condition 2 plausible. We ought to also consider the prior beliefs held by many that there are many other investments satisfying Conditions 1 and 2 with much, much larger net social benefits. The competing priorities are obvious: primary and secondary education, primary health care, universal health insurance, and, perhaps most relevant in many African settings, HIV/AIDS prevention and treatment. If public sectors have sufficient resources to fund all in-

vestments for which Conditions 1 and 2 hold, they should certainly do so. But in the absence of sufficient resources, they ought to prioritize.

Credit Constraints and the Difficulties of Targeting

The second line of argument used by advocates of a general subsidy has to do with the existence of credit-constrained individuals and the difficulties of targeting subsidies to these individuals. We have defined credit-constrained individuals as those who would enjoy net private benefits from higher education, but who cannot access sufficient funds to pay for the investment. This category may include the bulk of secondary school graduates in developing countries. A general subsidy, by making college cheaper for everyone who goes, could help this subset of students.

The clear problem with the general subsidy, one readily admitted by those who aim to ease the credit constraint, is known as "leakage." If the potential college population consists of both the credit-constrained and the non-credit-constrained, then a general subsidy induces the socially appropriate action from the former but, according to the reasoning developed in the previous section, is no more than a transfer to the latter. Thus, only a part of the general subsidy performs the necessary task of inducing investment; and the rest, while a drain on the public's resources, goes into the hands of the relatively well off, since it is these who are less likely to be constrained by credit.

A potential solution to the leakage problem, if it were feasible, would be to replace a general subsidy with a targeted one. That is, if the state could find some mechanism to distinguish those who are credit constrained from those who are not, then it could target the subsidy only to those who need it. Thus, targeting could eliminate the need for a general subsidy and its accompanying leakages.

The problem is that targeting is not always feasible, so it may be argued that given these difficulties, the best solution to helping credit-constrained individuals is to offer a general subsidy. To assess the reasonableness of this view, we may once again resort to the three necessary conditions that comprise the state's decision rule. As we said, to simplify exposition, we can consider the problem of credit constraints while ruling out the problem of externalities. And if no externalities exist, Condition 1 is satisfied if it can be shown that investments in education yield sufficiently high private benefits. Most people would agree with this, including Schultz, who in fact invokes estimates of high private benefits to argue against general subsidies. On the other hand, among the social costs of the investment are now these leakages mentioned above. These are real resource burdens shouldered by the public that do not produce any new benefits, private or public, beyond those that would have existed in their

absence. We therefore see that the size of the leakages has a negative impact on the size of the net social benefit, although, on the whole, people are likely to believe that total net benefits remain positive.

It may seem surprising that, although the exposition of the conditions under which Condition 2 might be true in the previous section was relatively complex, here it is rather simple. Under the assumption that net private benefits are positive—and because net private benefits are a component of net social benefits—then any individual who does not have sufficient funds to make this investment is failing to make the socially desirable investment. So the mere presence of credit constraints, along with the assumption of positive net private benefits, is very likely to make Condition 2 true.

Lastly, whether Condition 3 will be satisfied is largely an empirical matter, but one on which many of us probably have strong prior beliefs. We do not doubt that there are large private gains from higher education, but we do question whether these gains are likely to be as large as the gains from the alternative investments already mentioned above.

So we find that arguing for a general subsidy to aid credit-constrained individuals requires evidence of the following: positive net private benefits, small leakages from a general subsidy, difficulties of targeting, and large net social benefits relative to other competing investments.

Expanding the Idea of Returns to Education

As we have seen, economists approach questions about educational policy by treating education, whether primary, secondary, or tertiary, as an investment decision. That is, it is a decision that requires us to incur costs in the short term in order to reap benefits to be enjoyed over the longer term. Economists traditionally define the private benefits of this investment as equal to the present discounted value of the higher lifetime trajectory of earnings that result from having a college education. The larger this value, the stronger an individual's incentive for pursuing this investment. They also traditionally define the public returns in terms of the positive externalities mentioned above. But the question ought to be asked: Are these really the only private and public benefits of education?

We would like to argue that the work done by economists who study health, fertility, and human capital issues in developing countries implies that the current definitions are too narrow. For example, we know that female and maternal education are among the central determinants of such outcomes as children's health, women's fertility, and women's mortality. We know that the better educated tend to experience lower morbidity and mortality rates. While the precise extent of the causal relationship from education to these outcomes is debatable, most would probably agree that there is some true genuine causal effect from

education to these outcomes. If so, then this body of work shows that there are substantial benefits to education other than higher lifetime earnings.

Whether these benefits flow mainly from basic and secondary education or from higher education, it is clear that they have both a private and public nature. The better educated tend to live longer and healthier lives. In addition, better educated women tend to have a smaller number of "higher quality" children and are less likely to experience maternal mortality. These are benefits enjoyed by the individuals who make the investment. That is, they are private benefits. But they have a public character as well. Economists speak of the quality-quantity trade-off in children, referring to a woman's choice to either have a small number of children in whose health and education they can invest greatly or to have a large number of children, each of whom receives much smaller investments. The better educated the parents, the more likely they are to choose the former option. These choices in aggregate may have a profound effect on the possibilities for socioeconomic development decades after they are made. Societies that choose smaller numbers of higher quality children will, in twenty years time or so, have a much higher endowment of human capital upon which to rely for development, as well as reduced exposure to the pressures and strains that accompany larger populations. The welfare benefits from this could be truly large.

What are the implications of our argument? We draw two. First, the private and public benefits to education are probably much larger than economists have traditionally argued. This is not an argument in favor of a general subsidy for higher education. These benefits potentially result from all levels of education and are, in fact, more likely to result from investments in primary and secondary education. Thus, considering the existence of these benefits is more likely to strengthen the argument for subsidies at the primary and secondary level beyond the level that would be supported by the traditional calculations.

But the second implication is that, although the benefits are potentially much larger than we had thought, it will probably be very difficult to estimate how much larger. This "measurement" problem has an empirical aspect and a philosophical one. First, while there is relative agreement on the value of the improved lifetime earnings that result from education, there is much less consensus on the size of these health and population benefits. How many years of life, what is the lower probability of experiencing morbidity, how many fewer children, and how much better educated and healthier will these children be as a result of more education? Empirical work is only starting to shed light on these questions. Much more intractable are the philosophical obstacles of attaching a monetary value to these outcomes—a value which is necessary to compute a rate of return—even if we did have an accurate estimate of their magnitudes.

Here, with this second difficulty, we run into the boundaries of economics. A central assumption in this discipline is that we can express how valuable objects are by attaching a price to them. Thus, a computer may have a price tag of $700, and a pound of rice, $2. A numerical computation of how valuable education is can only be done if we impute a monetary value to all of its benefits, including those of improved health and smaller, better-educated populations. Can we really do this?

The philosophical obstacles are themselves twofold. First, can we impute a monetary value to health benefits experienced by particular people? If we could, then we would have no problem recalculating the rate of return to incorporate the improved health outcomes enjoyed by the individuals who make the investment. While this is a thorny issue, there is a relatively well-developed line of inquiry in health economics that answers this question in the affirmative. One can observe the income compensation demanded by people for taking on risky occupations, or observe what consumers are willing to pay for safety devices that reduce the risk of harm, or survey individuals directly about their willingness to pay for health improvements. From these observations, we can make inferences about how much people themselves value health outcomes and use these inferences in the rate of return calculations. In the United States, for example, it is customary to value a year of life lived in good health at $100,000. One often hears the rule of thumb that the value of a year of life can be estimated at roughly three times the per capita income of a person's home country.

But the second aspect is much more intractable, and the economic tradition here offers very little systematic guidance. What is the monetary value of the net benefit, to a household and to society, of having a smaller number of highly educated and healthy people over a larger number of less educated and less healthy ones? This question is different from the previous one because the previous one never has to ask how to value the lives, or the quality of life, of people who do not already exist. As long as we ask about the money value of a particular health gain to a particular person who already exists, we can resort to the admittedly controversial but sufficiently well-entrenched logic in the previous paragraph. In fact, if offspring and future populations are relevant to our welfare calculations only to the extent that they provide benefits to people who already exist, then they would pose no deeper problems than those already discussed. If a smaller number of offspring allows parents to enjoy higher standards of living today, these benefits are easily monetized. If these offspring will be future sources of retirement income for their parents, these benefits are easily monetized too. But we assume that these people's existence has intrinsic value, independent of the value contributed to people who already exist. If we have more education today, we will probably have fewer people with higher

standards of living tomorrow. Thus, education reduces the number of future people but raises their standard of living. How do we value this outcome? How does the number of these future people matter? And how does their quality of life matter? What kinds of answers could one give to these questions?

A ruthlessly consistent economist might say that the capitalized value of the life of a highly educated person is $3M while that of a less educated person is $1M. The problem thus is a simple matter of multiplying the capitalized values by population sizes, and doing the math to compute the net benefit. But does this really work? Work in ethics by Derek Parfit (1984) shows that this kind of logic leads to what he calls the "repugnant conclusion," which adapted to our example, says that if we try to argue this way, it will be better to have a great many poorly educated people than a smaller number of well-educated people, because $1M times a very large number will be much larger than $3M times a smaller number. In the limit, this logic could lead us to prefer the largest possible number of barely literate individuals, a truly repugnant conclusion.

Another answer might say that, to measure the benefit to households and societies of fewer, higher quality children, one should define the benefit as being equal only to the improvement in the average quality of the children. While this gets around the repugnant conclusion and gives us the intuitively sensible result that it is better to have fewer, higher quality children, it does so at a serious cost. It assumes that the numbers of people who are born, conditional on the well-being these people will have, does not matter. Do we really believe this? When parents decide they want to have one more child, certainly they do so because they believe they will be better off if they do. To them, numbers matter. Shouldn't they therefore also matter to society?

We do not know how to resolve this last conundrum. And perhaps, recalling all the difficulties of valuation introduced by these additional benefits, it is not surprising that economists omit them from their calculations. But we ought to guard against simplifying the rate of return calculations for pragmatic reasons and then deriving policy rules as if the simplifications were truly valid. If we really believe that these outcomes of educational investments are real, then we have reasons for devoting more resources to them. Exactly how much more is a matter that may never be fully resolved because of the valuation problems we have only briefly discussed. But our gut feeling is that these arguments justify substantially larger allocations of resources to education, especially at the primary and secondary levels.

Conclusion

The view that developing countries ought to offer general subsidies for higher education has strong supporters. We have tried to use traditional economic logic to specify the conditions under which such a policy would promote a more socially efficient allocation of resources. We came up with three necessary conditions. Condition 1: The net social benefit from the investments must be positive. Condition 2: Private actors must have insufficient ability or incentive to undertake the socially optimal levels of investment. Condition 3: These subsidies must generate more net social benefits than competing uses of public funds. We reason that the first condition is likely satisfied, the second criterion not clearly so, and the third perhaps not. We therefore conclude that, on the whole, there is no clear-cut efficiency reason for a general subsidy. We also describe the elasticities that, if measured, could give us a clearer idea of whether the second criterion is fulfilled. These would be fruitful subjects of future empirical research.

Notes

1 This note evolved from a set of discussants' comments prepared in response to a paper presented by T. Paul Schultz, "Higher Education in Africa: Monitoring Efficiency and Improving Equity," at the Conference on International Higher Education and African Development organized by the Yale Center for International and Area Studies on October 18-21, 2001.

2 In particular, we ignore what could in reality be decisive political factors determining whether general subsidies continue or not. There is very strong political support for general subsidies for higher education among local elites in developing countries. Their existence has come to be seen by these elites as an entitlement to be defended with a passion that seems out of proportion to the increased monetary burden to them from eliminating these subsidies. We have little doubt that evading the political conflict that would result from eliminating this perceived entitlement provides no small motivation in the eyes of government for maintaining them.

3 For somewhat different treatments of this topic, see Birdsall (1996) and Task Force on Higher Education (2000).

4 This simple table glosses over some details that would naturally be included in a more comprehensive treatment. For example, the existence of income taxes implies that the private benefit to education is the lifetime of higher wage levels after taxes. In addition, future income tax revenues should be considered part of public benefits. The existence of taxes also implies that the opportunity cost of going to college (the foregone income which one could have earned instead) consists of the *post tax income* the individual could have earned and the tax revenue the state could have collected.

5 Economists should note that these three conditions can be replaced by a modified version of the first two if, in the computation of the net social benefit of a project,

one uses the rate of return of the best alternative project as the shadow cost of funds. These decision rules, more useful in the stated form for lumpy investments, generalize naturally to the case where the scale of a particular investment is variable.

6 If positive externalities exist and are large enough, they could also potentially reverse our initial statements about the regressivity of general subsidies. This might happen if these externalities result in benefits that trickle down to the poor and thereby reduce inequality in the distribution of income.

7 Many economists hold strong views on the matter of elasticities. For example, Schultz (2001) argues that the private returns to higher education are so large that private individuals probably already have sufficient incentives to take the proper investments from society's point of view, implying that demand is probably relatively inelastic. To subsidize private individuals under these conditions is to simply give them money to make decisions they would have made anyway. It is therefore a transfer, rather than an inducement. And if, as we said at the start, most college students come from the elite social classes, this transfer is regressive.

Some additional empirical research might lead us to firmer conclusions concerning this elasticity. For example, it is interesting to note that Schultz's argument is less a direct empirical estimate of demand elasticity than it is an inference made from studies of the returns to education. They are so high that he finds it safe to infer that any reasonable private individual's calculation would point to going to college as the right decision. The net private benefits from doing so are so clearly large that moderate variations in the costs of the investment are unlikely to change this decision. Thus, inelasticity is inferred.

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Private and Public Values of Higher Education in Developing Countries: Guidelines for Investment

Robert E. Evenson*

Abstract

This paper argues that while scientific and technical "knowledge" is an international public good, the conversion of knowledge to inventions and innovations is not. Knowledge conversion is affected by natural (soil, climate) and economic (prices, wages) conditions. This means that the conversion of knowledge to economic growth production is quite location specific. Knowledge conversion is also subject to high technology "mastery" requirements. Technology mastery also requires specialization by field of technology. These knowledge conversion conditions place a high premium on applied science and engineering skills. The "price of admission" to the economic growth club is high. This, in turn, means that Higher Education programs creating these skills have a "public" externality value that is much higher than the private value of these skills in labor markets. This public value is high enough to justify investments in foreign degree training and in programs to create graduate programs in the invention/innovation fields in many African universities.

Résumé

Le « savoir » scientifique et technique est un bien public international, contrairement à la conversion du savoir en inventions et en innovations. La conversion du savoir est déterminée par les conditions naturelles (sols, climat) et économiques (prix, salaires). Cela signifie que le type de conversion du savoir en croissance économique est spécifique à l'endroit où l'on se trouve. La conversion du savoir est également sujette à une réelle maîtrise de la haute technologie. La maîtrise technologique exige également une spécialisation dans un domaine de la technologie. Dans le cadre de ces conditions de conversion

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du savoir, la science appliquée et le savoir-faire en ingénierie occupent une place de choix. Le « prix à payer » pour intégrer le club fermé de la croissance économique est élevé. Cela signifie que les programmes de l'enseignement supérieur produisant ce savoir-faire ont une valeur « externe » publique qui est beaucoup plus importante que la valeur privée de ce savoir-faire au niveau du marché du travail. Cette valeur publique est suffisamment élevée pour justifier des investissements dans le domaine de la formation étrangère diplômante et au niveau de programmes diplômants dans le domaine de l'invention/innovation dans plusieurs universités africaines.

Introduction

Knowledge in the form of codified understanding of social and natural phenomena is an international public good. Knowledge is produced in universities and research institutions. Knowledge is also mastered in universities and other higher education programs. Because investment in higher education varies greatly from country to country, the capacity to produce new knowledge varies from country to country. The degree to which populations master knowledge varies as well. Knowledge is converted to technology by the act of invention. Inventions are "reduced to practice" by innovative activities. Technology, like knowledge, must be mastered and understood to be employed.

The "transferability" of technology from one location to another location depends on two sets of factors. It depends first on differences in natural (soil, climate) and economic (prices, wages) conditions between the two locations. This is because natural conditions affect the performance of crops and animals and even humans. These natural conditions govern the natural evolution of plant and animal breeding (genetic improvement) programs dedicated to achieving improved performance. Price differentials also matter because they affect costs. In many low-wage economies, activities that are performed by machines in high-wage economies are performed by hand (e.g., rice harvesting). The second factor is the "tacit" understanding or mastery of technology by agents in the transferee location. Technology transfer simply does not take place without transferee competence and understanding. Much of this transferee competence in modernizing developing countries is associated with foreign direct investment (FDI) programs. But much of it is created by higher education programs.

Many economic development programs are based on the proposition that technology is highly transferable and that tacit mastery does not require high levels of skills. Most African countries have made limited investments in the higher education programs associated with the mastery of knowledge and with technology mastery. Unfortunately, forty years of development experience in

Africa lead one to conclude that "easy" technology transfer simply does not take place.

When technology transfer is inhibited by natural and economic conditions, the transferee country must have adaptive invention/innovation capability. The inhibition of crop genetic improvement (CGI) technology by soil and climate conditions is well understood and factored into policy design. No serious observer of agricultural development in Africa (or Asia or Latin America) expects productivity improvement without years of building plant breeding adaptive innovation capacity located in each agro-ecology zone (AEZ). If this capacity has not been built for the AEZ, the AEZ does not have significant productivity growth.

While agricultural development practitioners generally understand that local adaptive innovation capacity is essential to take advantage of knowledge and technological developments originating outside the country, the low-cost technology transfer model has endured for other forms of technology, and this model has clearly failed for African countries. This failure is manifest in two empirical observations. The first is that no African country has achieved significant productivity growth in the industrial sector if it has not already achieved productivity growth in the agricultural sector. The second is that no African country has achieved significant productivity growth in the industrial sector unless the country has either "exploited foreigners" through foreign direct investment (FDI) arrangements or developed Research and Development (R&D) capabilities in domestic industrial producing firms (Evenson 2002).

In this paper, I develop further evidence for these statements and show that building capacity in higher education programs is essential if African countries are to achieve "modern economic growth." I will also argue that this implies a high public value to the specific types of higher education that are essential to imitations and adaptive innovation capacity. These high public values are sufficient to justify higher levels of public investment in specialized higher education programs.

The next section of this paper assesses these growth-related values. The operative question is whether the public values of higher education programs linked to economic growth can justify more investment in higher education programs in Africa. I then discuss growth production skills in relation to the dynamic long-term building of "technology capital" (TC), followed by a discussion of policy issues associated with the international migration of skill holders.

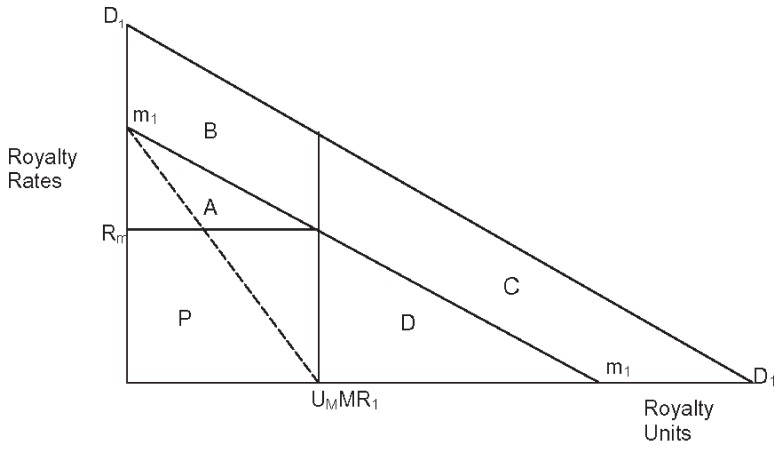
Invention and Technology Acquisition Skills: Public/Private Values

In this section, the model of invention with Intellectual Property Rights (IPRs) serves as a starting point to illustrate the relationship between private and public values of invention skills. I then present a model of public-sector invention to illustrate similar relationships, followed by a consideration of methods of technology acquisition. A review of data from studies of returns to research and extension programs in both public and private R&D organizations assesses public-private value magnitudes.

The Invention Model with Intellectual Property Rights (IPR)

Consider the basic economics of an invention model in which the demand for an invention when the invention is commercialized (i.e., an innovation) is expressed in present-value terms. Figure 1 depicts this demand in terms of royalty rates and royalty units, and denoted as D_1D_1.

Figure 2: Public Sector Inventions



The demand for inventions in a given economy is fundamentally based on the contribution that the invention makes to cost reduction and/or product improvement in actual use. Thus, a country without skills to actually use the invention will have little demand for the invention. The demand curve slopes downward because few units are demanded at high royalty rates; but as royalty rates are lowered, the invention becomes economically viable in more units of use (Evenson 2000).

IPRs provide IPR owners with a limited or partial monopoly right (i.e., the right to exclude) and the effective monopoly demand is depicted as m_1m_1. The M_1M_1 curve lies below the d_1–d_1 demand curve because monopoly rights are limited in terms of time (17 to 20 years) and scope. But, perhaps more importantly, they are limited by competitive inventions. There is a good chance that this invention will have a reasonably close substitute before many years have passed. (This is one of the features of an effective patent IPR. The requirement that the invention be disclosed stimulates subsequent invention.) The monopoly rents that the IPR owner can collect then will be p (where mr = 0) and the royalty rate will ber_m, and u_m units will be sold.

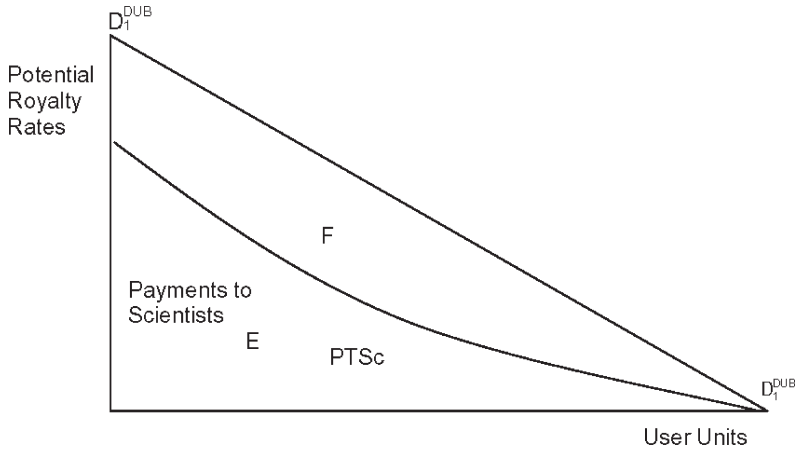
In the case of this IPR-protected invention then, the private value will be p and the public value will be a + b. The area a can be thought of as the "normal" economic surplus associated with this invention and the inventive effort and innovative effort required to produce it.[1] The area b represents an "extra" public value associated with the limited monopoly right and with disclosure-induced substitutes for this invention. Note that with IPRs, the areas c + d are not realized until the IPR expires. It is sometimes argued that the area c + d constitutes a "welfare loss," but that is not a proper interpretation if this invention would not have been produced in the absence of IPRs. In that case, the areas b + A represent welfare gains that would not have been realized otherwise.[2]

Figure 2 also depicts a situation where the public sector undertakes the invention and does not charge a royalty fee. This would be the situation for an agricultural experiment station developing new crop varieties. The average costs of scientists are depicted in Figure 2 as E and total public value is E + F, the full area under the demand (or average revenue). Evidence presented below in the section on "Dynamic Technology Capital Issues" indicates that the ratio of F to E in Figure 2 is approximately the same as the ratio of a + b + c + d to p in Figure 1.

A natural question to ask regarding these figures is why countries use IPR systems for invention when these systems do not allow full public value to be captured (i.e., the areas c + d are not realized) until after the IPR expires? Note, however, that if IPR systems are the only alternative (i.e., public programs are unwilling or unable to invent), then the IPR system does create public value in terms of the areas a + b that would not otherwise be available to society.

IPRs are widely regarded as a very "blunt" instrument for providing incentives for invention. But their use is almost universal in all developed market economies, and the strength and scope of IPRs are steadily increasing in all developed market economies Kremer (1998) discusses issues associated with attempting to capture the area c + d.

Figure 2: Public Sector Inventions



Are public sector R&D organizations unable and unwilling to invent? No, there are many fields where IPR systems have not been effective in stimulating private sector invention (or available to do so) and where public sector invention systems have emerged. The agricultural experiment station is a case in point. Traditional patent protection was not available to plant and animal breeders in the United States until the 1970s when courts broadened the scope of patent protection.[3] The public agricultural experiment station research "model" was developed in the mid-1800s to provide biological inventions for agriculture. And those public experiment stations have achieved a distinguished record of invention in the form of modern plant varieties and animal improvements. But chemical, mechanical, and electrical invention for agriculture has been dominated by private firms even in cases where the public sector has attempted to compete. With the expansion of IPRs to plants and animals and potentially to biotechnology inventions, the competitive edge of private firms has become pronounced in all fields of agricultural inventions.

But private sector invention is itself located in a larger system of public research and public and private academic system support. The modern agricultural invention system in public sector programs features the development of the applied agricultural sciences. These science fields support both private and public sector inventors (Huffman & Evenson 1993).

International Issues: Why Should Developing Countries *Recognize the IPRs of Developed Country Inventors?*

Two issues govern the internationalization of IPR systems. The first is the relative competitiveness of domestic versus foreign inventions. The second is the location or country specificity of technology.

International patterns in invention data inform the first issue. Most OECD countries are characterized by approximate competitiveness between domestic inventors and inventors in other OECD countries. This competitiveness is reflected in the fact that inventors in one country often obtain IPR protection in other countries (including developing countries). They thus have a "technology seller's" stake that is important. By contrast, inventors in developing countries protect few of their inventions in other countries. Most of their domestic inventions are adaptations of "upstream" inventions. They have very limited technology seller's stakes to protect.

One measure of the degree of location specificity of invention is the ratio of domestic inventions protected abroad to total domestic invention. For agricultural crop inventions (i.e., modern crop varieties), inventions made in one country have low rates of use in another country. The proportion of crop varieties developed in a National Agricultural Research System (NARS) and released in another country is typically less than 10% of varieties developed domestically. The proportion of varieties developed in international agricultural research centers (IARCs) and released in several countries is much higher. Virtually no crop varieties produced for developed countries are actually planted in developing countries (Evenson & Gollin, 2002, chap. 21).

These two issues create policy problems for developing countries. The asymmetry between the technology sellers' and technology buyers' interests in OECD countries is low and these countries have long recognized each other's IPRs. But the asymmetry between the technology sellers' rights of developed and developing countries has long been expressed in the form of efforts by developing countries to avoid or evade the recognition of the IPRs of developed country inventors. It has also inhibited the development of IPR systems in developing countries to stimulate domestic adaptive invention and related tacit knowledge acquisition vital to their growth.

When location specificity is high, as it is in agriculture, the policy remedy is simple and straightforward. You either build adaptive invention programs or you don't get technology-based growth. For agricultural invention, the tradition of public sector research in the absence of effective IPRs has led to a broad-scale development of invention capacity. The Green Revolution was created by public sector national and international experiment stations. But for

Table 1: Internal Rates of Return (IRR) Estimates Summary

	Number of IRRs Reported	Percent Distribution of IRRs by IRR Range						Approx. median IRR
		0-20	21-40	41-60	61-80	81-100	100+	
Extension	81	0.26	0.23	0.16	0.03	0.19	0.13	41
By Region:								
OECD	19	0.11	0.31	0.16	0	0.11	0.16	50
Asia	21	0.24	0.19	0.19	0.14	0.09	0.14	47
Latin America	23	0.13	0.26	0.34	0.08	0.08	0.09	46
Africa	10	0.40	0.30	0.20	0.10	0	0	27
Applied Research	375	0.18	0.23	0.20	0.14	0.08	0.16	49
By Region:								
OECD	146	0.15	0.35	0.21	0.10	0.07	0.11	40
Asia	120	0.08	0.18	0.21	0.15	0.11	0.26	67
Latin America	80	0.15	0.29	0.29	0.15	0.07	0.06	47
Africa	44	0.27	0.27	0.18	0.11	0.11	0.05	37
Pre-invention science	12	0	0.17	0.33	0.17	0.17	0.17	60
Private sector R&D	11	0.18	0.09	0.45	0.09	0.18	0	50
Ex ante research	87	0.32	0.34	0.21	0.06	0.01	0.06	42

Source: Evenson (2002)

many other fields of invention, hostility in developing countries to IPRs has meant that they have not built domestic adaptive invention capabilities, and many have not built a capacity to effectively "imitate" foreign origin technology.

Rate of Return Evidence and Relevance to

Higher Education Programs

In this section, I summarize rate of return evidence for agricultural research and extension programs and consider the magnitudes of public values (areas A and B in Figure 1 and area F in Figure 2). It should be noted that this evidence is from programs where a high degree of location specificity is present.

Table 1 reports a summary of calculated "internal rates of return" (IRR) to agricultural research and extension programs.

These estimates are reviewed in detail in Evenson (2001) and are summarized here. The review considered 81 estimates of IRRs for extension programs from 50 different studies and 375 estimates of IRRs for public sector agricultural research programs from 175 different studies. I report percentage distributions of these IRRs by region for IRR classes (0–20, 21–40, etc.) and report median IRRs as well. In addition, I report IRRs in the same format for studies of pre-invention or basic science research, private sector R&D programs producing inventions "used" in the agricultural sector and for *ex ante* studies of expected research impact.

Two features characterize all classes of IRR estimates. The first is that the range of estimates is broad, ranging from zero IRRs, indicating no measurable program impacts on agricultural production to very high IRRs, measuring high program impacts. The second feature of these estimates is that the median IRRs are high and generally well above "equilibrium" returns to investments in a market economy. The methodology employed in the studies reviewed captured the "social" or public return to investment in research and extension programs (area *a+b* in Figure 1 and area *F* in Figure 2). I counted both surpluses for both producers and consumers as benefits. In a world of efficient resource allocation, these social returns and investment would be roughly equivalent to private returns; but in the real world of inefficient public sector resource allocation, these high median IRRs are consistent with the observation that IRRs to private sector R&D are much lower than the social returns reported in Table 1.

Actually, the IRRs reported for private sector R&D programs are entirely in the form of external benefits realized in the agricultural sector. That is they include area *A+B* in Figure 1 but not area p, because private returns (area p) are captured in the prices that farmers paid for farm machinery, chemicals, and

seeds from the private sector. Using the time weights in the IRR studies, we can estimate the ratio of the area a+b to p in Figure 1, assuming that private sector returns are in the 20 to 25% range. This ratio is approximately 4.

We can also compute the ratio of public values to "normal" private values (20% IRRs) for extension programs using extension time weights (which are shorter) and for public sector research program using the time weights estimated in the research studies. This is the ratio of the area f and to the area e in Figure 1. These estimates for extension programs range from 2 to 3. They are roughly 3 for countries outside Africa and 2 for Africa. The "extra" surplus (as measured by b in Figure 1) is one to two times P (Figure 1).

For research programs, these ratios are higher. They range from 5 to 7, being approximately 5 for African programs and 7 for Asian programs. The "extra" public values from these calculations range from three to five times *p* or *e*. (See below for calculations based on these publications.)

For agricultural invention, the IRR evidence is quite clear. Many of these IRRs were estimated for plant breeding programs. Effective development of modern crop varieties requires "frontier" technical capabilities. The breeding problems of genetic resource evaluation, of identifying sources of host plant resistance to plant diseases and insect pests, and of host plant tolerance to abiotic stresses require advanced skills. Progress requires years of commitment and of scientific exchange by specialized breeders, plant pathologists, entomologists, geneticists, physiologists, and other scientists. Such demands generally mean Ph.D. training, especially Ph.D. training at the "frontier." It also means long-term commitments of people and institutions. Plant breeders often invest ten or more years of effort before the release of their first variety.

Not only are crop inventions demanding in terms of skills and of institutional support for skills, but the demands for success are also, if anything, higher in the poorest countries where production environments are often highly unfavorable. Thus, in many African countries the challenges for biological inventions are great, and the public value of highest level skills is highest in this context.

Dynamic Technology Capital Issues and Technology

Acquisition by Low-Income Countries

Only about 35 to 40 of the 90-plus developing countries with populations over 1 million have anything approaching a viable IPR system to stimulate private sector inventions. In Africa, only South Africa and Zimbabwe have functioning IPR systems. Certainly there is some private sector adaptive invention and innovation access in countries without IPR systems, but growth evidence indicates that it is very limited. Still, some hold the view that adaptive invention is

not needed in the chemical, electrical, and mechanical fields. This is the "anyone can read a blueprint" perspective on development. Yet the economic growth experience of developing countries is that no countries without a significant adaptive invention capacity in private-sector-producing firms have achieved significant economic growth. (See the following section.)

For chemical inventions, and to a lesser degree, for modern electrical inventions, a strong higher education component appears to be critical. A study of successful inventors in India (one of the few studies of inventors available) concluded that the skill levels for domestic inventors in India engaged in adaptive invention were as high as those characteristic of inventors in developed countries (Evenson 1996). The high proportion of successful inventors with foreign degrees in developing countries attests further to the value of specialized training. In short, Indian inventors aren't competitive unless they have an advanced degree, and they are more successful if the degree is from a foreign university program.

To consider these issues further, I have used a classification of levels of technological capital (TC) in studies of agricultural growth. I briefly review that application here, then calculate the public values of increasing TC.

Technological Capital

The terms "social capital," "institutional capital," and "infrastructural capital" have been used in recent years to describe the conditions under which economic activity takes place in different countries. The term "technological capital" is similarly designed to describe the conditions (the knowledge and the transaction costs associated with knowledge acquisition) specific to the implementation of technology by producers in an economy. These conditions affect the actual use of techniques at a given point in time and hence, the public value of skills associated both with the adoption and diffusion of existing techniques of production and with the adaptive invention of improved techniques over time.

The technology capital classification developed here is motivated by studies of agricultural technology but has more general relevance. An important distinction is made in agricultural studies between activities designed to move farmers closer to the "best practice" technology frontier and designed to move the best practice frontier itself through adaptive invention. The skills required for these two types of activities differ in degree of difficulty and in the required training. In general, the skills required to move the frontier are of a very high level, as noted above. They require doctoral training in applied science fields (plant pathology, entomology, genetics, agronomy). Skills required for moving farmers toward the frontier are advisory skills. These skills are less specialized than those of the researcher and are usually acquired in bachelor's and master's degree programs.

Consider Table 3, which displays five different levels of technology capacity. For each, a set of yield levels is depicted for a typical crop. These yield levels should be considered to be standardized for fertilizer, water, labor, and other inputs. Four yield levels are depicted. The first is the actual yield (A) realized on the average farmer's fields. The second is the "best practice" yield (BP) which can be realized using the best available technology. It is possible that some farmers obtain best practice yields but the average farmer typically does not. The third level is the "research potential" (RP) yield. That is, it is the hypothetical best practice yield that would be expected to be attained as a result of a successful applied research program directed toward this crop. The fourth is the "science potential" (SP) yield. This is also a hypothetical yield. It is the research potential yield attainable if new scientific discoveries (e.g., in biotechnology) are made and used in an applied research program.

Associated with these yields, we can define three "gaps." The "extension-infrastructure gap" is the difference between best practice (BP) and average (A) yields. Extension programs and infrastructure investments are designed to close this gap. The "research gap" is the difference between research potential (RP) yields and best practice (BP) yields. Applied research programs, if successful, will close this gap and will thus open up the extension-infrastructure gap. Similarly, a "science gap" exists between science potential (SP) and research potential (RP) yields.

Consider technology capital (TC) level I. This is a level where little extension, research, or science is being undertaken. Farmer schooling levels are low, markets are poor, and infrastructure is lacking.[4] The extension gap is large in this stage; thus, there is considerable scope for a high payoff to extension and infrastructure on investment, even if there are few effective research programs that are raising best practice yields. After extension programs have achieved a transition to Level II, the extension gap will have been reduced to some fraction of its original size (EXTGAP 1). In fact, the economy now becomes dependent on closing the research gap to open up the extension gap. As the economy is transformed from Level II to Level III, a direct link between research and extension is forged. Extension programs now become responsible for extending relatively newly developed technology to farmers.

When more basic or "pre-invention" science becomes more effective, the research potential yield (RP) is raised; and with active research and extension programs, the economy may move into Level IV. Further progress, i.e., to Level V and beyond, depends on effective pre-invention science, research, and extension programming.

Table 3: Schematic Crop Yields (and GAPs) by Technological Capacity Level

Science Potential Yield		SP		SP		SP		SP	Science GAP	SP
	Science GAP		Science GAP		Science GAP		Science GAP		Research GAP	RP
Research Potential Yield							Research GAP	RP	EXTGAP 1	BP
							EXTGAP 1	BP		A
Best Practice Yield	Research GAP	RP	Research GAP	RP	Research GAP	RP		A		
					EXTGAP 1	BP				
	EXTGAP 1	BP	EXTGAP 1	BP		A				
Actual Yield	EXTGAP 2			A						
		A								
	TC Level 1		**TC Level II**		**TC Level III**		**TC Level IV**		**TC Level V**	

Source: Evenson (2000)

Consider the situation in Africa and Asia. It appears that much of Africa has not yet made the transition to Level II and no country appears to have achieved a transition to Level III where research systems are producing significant flows of new technology suited to farmers in many regions. In contrast, in both South and Southeast Asia by the mid-1960s many economies were already in Level II, and green revolution technology in rice, wheat, corn, and other crops after 1965 enabled them to make the transition to Level III. Today in many Asian

and Latin American countries, Level IV infrastructure exists. (See below for specifics.)

In theory, it is possible that research systems can raise best practice yields before economies have made the transition to Level II. In practice, few countries have done so. Most research gains have been realized in economies that have already achieved Level II or III market and infrastructure and skills levels. We do not yet fully appreciate the factors that initiate a successful closing of this research gap. In some cases, such success has been induced by the development (often in international centers) of genetic resources and methods that increase the RP yield levels. In Africa these RP yield levels for some countries may be quite low because of limited genetic resources and difficult disease and insect problems, so that the research gap is actually quite small. If this is the case, "stimulus from above" in the form of improvements in science (closing of the science gap) may be required to achieve better research performance.

Technology Capacity in Developing Countries

Many discussions of developing countries utilize a simple north/south distinction. But this distinction masks the degree of diversity of innovation/imitation competence or capacity among developing countries.

Table 4 defines four technology capacity (TC) classes using six objective indicators. For a given period, a country can be placed into a unique TC class based on these indicators. The imitation indicators include literacy and agricultural extension. The innovation indicators include agricultural research programs (almost entirely public until recent years), R&D in manufacturing firms, foreign direct investment, and IPRs.

Based on these indicators, countries can be grouped in classes I to IV for each of three periods, 1961–1976, 1971–1986, and 1981–1996. The 93 developing countries in these classes are shown in Table 5 in classifications ranging from "111" through "444."

The "111" countries have remained in the lowest In/Im class for three periods. They are basically "failed states." They do not have the capacity to enforce laws and regulations. Some cannot even deliver the mail. They have not realized green revolution technology and have no gene revolution capacity.

The "112" countries have began to develop TC-2 capacity in period 3. None, however, has achieved productivity-driven industrial growth. A few have achieved green revolution gains, but these are very marginal. The 300 million people in the 20 "111" and "112" countries have realized little or no growth in per capita income. (See Table 2.) They remain almost completely excluded from the development process.

Table 4: Technological Capital Indicators for Developing Countries

INDICATORS TC-I		*TC-II*	*TC-III*	*TC-IV* Adult male literacy
Less than 50%	More than 50%	More than 50%	More than 65%	Agricultural research investment/Agr VA
Less than .1%	.2% to 3%	More than .2%	More than .3%	Agricultural extension/Agr VA
Less than .1%	.1% to .2%	.1% to 2%	2% to 1%	Foreign direct investment/GDP
Little or none	Less than .3%	More than .2%	More than 2%	R & D in manufacturing firms/value added
None	None	Less than .3%	More than .3%	Intellectual property rights
None	None	Weak	Moderate	

Source: Evenson, (2000)

Table 5: Country TC Classifications 1961-1976, 1971-1986, 1981-1996

111	*112*	*222*	*223*	*233*	*333*	*334*	*344*	*444*
Zaire (Congo)	Angola	Burki. Faso	Bangladesh	Dominican Rep.	Barbados	Algeria	Chile	Argentina
Congo/ Brazza.	Benin	Cote d'Ivoire	Botswana	Gabon	Cyprus	Bolivia	China	Brazil
Ethiopia	Burundi	Guatemala	Cameroon	Ghana	Guadalupe	Ecuador	Colombia	Costa Rica
Somalia	Cambodia	Laos	Guyana	Kenya	Indonesia	Egypt	Malaysia	South Africa
Afghanistan	Chad	Malawi	Madagascar	Nigeria	Iran	El Salvador	Mexico	
	Gambia	Sudan	Mali	Paraguay	Iraq	Honduras	Morocco	
	Guinea	Togo	Mongolia	Peru	Jordan	India	Thailand	
	Guinea Bissau	Uganda	Namibia	Senegal	Libya	Jamaica		
	Haiti		Nicaragua	Sierra Leone	Martinique	Saudi Arabia		
	Mauritania		Swaziland	Sri Lanka	Mauritius	Tunisia		
	Mozambique		Tanzania	Surinam	Pakistan	Turkey		
	Nepal			Vietnam	Panama	Uruguay		
	Rwanda			Zambia	Philippines	Zimbabwe		
	Yemen				Reunion			
					Syria			
					Trinidad-Tobago			
					Venezuela			

Table 2: Economic Indicators by Technology Capital Class

Country Code	Total Population		GDP per Capita		Rural Population Density	Irrigated Land		Fertilizer Consumption		Cereal Yield		Agricultural Productivity		Competitive Industrial Performance Index	
	1998 (Million)	**Annual Growth Rate (%)**	**Annual Growth Rate (%)**	**PPP (US$)**	**People per Km^2. of Arable Land**	**% of Crop Land**		**100 Grams per Hectare of Arable Land**		**Kg per Hectare**		**Agricultural Value Added per Worker 1995 $**		**Source: UNIDO Scoreboard database**	
		1978-	**1962-**	**1999**	**1999**	**1979-**	**1997-**	**1979-81**	**1997-99**	**1978-81**	**1998-**	**1979-81**	**1998-**	**1985**	**1998**
111	142	2.81	2.30	707	487	9.6	9.8	25	13	908	844	249	264		
112	132	2.78	-0.76	1256	504	8.8	12.9	61	115	940	1157	274	284	0.001	0.006
Group I *	**274**	**2.80**	**0.83**	**971**	**495**	**9.2**	**11.3**	**42**	**62**	**923**	**995**	**261**	**274**	**0.000**	**0.003**
222	108	2.66	0.32	1302	309	5.2	4.9	149	264	1038	1167	834	878	0.008	0.017
223	232	2.27	1.12	2797	843	17.4	35.4	755	936	1808	2384	325	424	0.008	0.009
233	311	2.46	1.37	1817	550	11.5	25.3	278	1091	1612	2242	620	821	0.012	0.013
Group II*	**651**	**2.43**	**1.11**	**2081**	**615**	**12.6**	**25.5**	**426**	**899**	**1587**	**2115**	**550**	**689**	**0.010**	**0.012**
333	586	2.48	2.61	3383	468	33.2	37.8	637	1230	1954	2767	1055	1432	0.026	0.076
334	1222	2.09	2.31	2814	444	25.2	34.6	494	1168	1477	2504	457	633	0.036	0.054
Group III*	**1808**	**2.21**	**2.40**	**2998**	**452**	**27.8**	**35.7**	**541**	**1189**	**1632**	**2589**	**651**	**892**	**0.033**	**0.061**
344	1517	1.40	3.93	4181	617	40.2	36.5	1329	2643	2861	4486	444	689	0.031	0.133
444	206	1.75	2.38	7991	67	3.9	4.9	795	1097	1635	2819	2963	5404	0.135	0.147
Group IV*	**1723**	**1.45**	**3.74**	**4636**	**551**	**35.8**	**32.7**	**1265**	**2458**	**2715**	**4287**	**745**	**1252**	**0.044**	**0.135**

* Values are the *sum* of the population in each group (in millions), and the rest are the population-weighed average of each indicator in the group.

The "222," "223," and "233" countries have innovative capacity in agriculture. Most have plant breeding programs. All have realized some green revolution gains. Few of these countries have gene revolution capabilities, although Kenya has a program. This group of 32 countries ("222," "223," and "233") with a population of 700 million people exhibits an important feature of developing country diversity, namely, that these countries have had some success in public sector innovation through plant breeding (a partial green revolution), but none can be described as having imitation success. That is, by and large they have not had productivity-driven growth in industrial employment. All are ranked very low on the UNIDO competitiveness indicator (UNIDO 2003, Table 2). Many early development modelers actually expected modernizing industry to "transform" traditional agriculture. This industry-driven transformation did not happen. Many of these countries are members of WTO but basically lack functioning IPR systems. Some have IPR laws but lack enforcement mechanisms.

The 1.8 billion people in the 30 countries in classes "333" and "334" have reached the stage of industrial competitiveness or near competitiveness. They have made the requisite investments in TC to realize per capita economic growth in the 4% range. Many are realizing this growth. (See Table 2.) Those not realizing this growth are engaged in civil conflict or in macro-economic mismanagement. For the largest country in the group, India, growth has been limited by an unwillingness to achieve openness.

The 1.8 billion people in 12 countries in the "344" and "444" classes have invested in the capacity to achieve very high economic growth (up to 8% per capita). As with the "333-334" group, countries not realizing this growth are usually engaging in macro-economic mismanagement (Argentina). The Asian Tiger economies (Hong Kong, Singapore, Taiwan, and South Korea) are no longer considered developing countries according this classification, while a number of former Soviet Union Republics (not considered here) have reverted to developing country status.

Economic Performance and Imitation Capacity

Table 2 reports economic performance indicators for the agricultural sector and for the economy generally by technology class. For purposes of organizing the data, I define four groups.

Group I includes the "111" and "112" countries. The 21 countries in this group had an average population in 1998 of 13 million. Their GDP per capita is low and is growing very slowly. The countries in this group have not achieved a significant green revolution in agriculture; only 1% or so of their cropped area is planted with modern varieties. Productivity growth in agriculture is

negligible. Their industries are not competitive. The proportion of their labor force in agriculture is high and is not changing.

Group I countries have effectively been excluded from the development process. Their own governments have failed them. And aid agencies have failed them. This failure is most clearly manifested in their capacity to innovate and imitate. And this, in turn, is a failure of higher education institutions.

The 32 countries in Group II are also relatively small, averaging a population of 20 million in 1998. These countries have had a partial green revolution. Their per capita income levels are double those of Group I; but even with the green revolution, these countries are growing slowly. The best performers in Group II have per capita income growth rates of 1.9%. Their industries remain uncompetitive, and competitiveness in industry is growing slowly.

The Group II countries represent an anomaly of development experience. Early development theorists stressed the "dual economy" model with a modern industrial sector and a backward agricultural sector. These models suggested that, with modest technology transfer, the industrial sector would be the leading growth sector in these economies. But that has not happened. These countries have had a green revolution because they invested in the higher education programs required to train agricultural scientists and make public sector investments to support these scientists.

But their industries remain uncompetitive because they did not invest in the engineering and technical skills to make them competitive, an investment which requires significant resources. Technology transfer simply does not take place unless the transferee has significant competence. A number of the countries in Group II are investing in that competence.

In contrast, the countries in Group III have industrial competence as well as green revolution competence. A majority of their cropland has planted in modern varieties. Their industrial sectors are reaching competence thresholds, and these industries are driving the growth process.

The Group IV countries have attained even further competence in industry, and both Groups III and IV are increasing this competence rapidly. They enjoy the benefits of both multi-generation green revolution growth and industrialization-led growth. Some countries have per-capita income growth rates exceeding 4%. Many, however, pursue macro-economic and trade policies that curtail this growth.

It is difficult to look at Tables 2 and 5 and conclude that African countries do not need higher education programs that will produce not just university graduates, but specifically inventors with scientific and engineering qualifications. African countries have been excluded from the modern growth process

realized by Group III and IV because they have not invested in technological capital.

The Dynamic Public Value of Technological Capacity

The construction of the technological capacity index is based on all levels of schooling, including the achievement of literacy and the development of R&D capacity requiring scientists and engineers. Agricultural researchers and many scientists engaged in industrial R&D have Ph.D.-level training. Group III, and particularly Group IV, technological capacity benefits from scientists and engineers with international training and experience. Agricultural extension workers and many engineers in R&D generally require bachelor's-level training.

In the section on "Invention and Technology Acquisition Skills: Public/ Private Values," I computed ratios of public values to private values and of public values to research costs in public research systems. These values were based on estimated research contributions and did not consider the added value associated with technology capacity enhancement and shortening the transition time required to move from one class to the next.

The average time to move one technological capacity class to the next was 20 years, with countries that did not move considered to have a 30-year period. The total factor productivity (TFP) increases associated with a one-step change was approximately 0.7%. The public value of making the move in 10 years instead of 20 was thus a 0.35% higher TFP growth rate. This dynamic element adds a further public value to investment in higher education for economic growth.

Policy Implications

Do public values associated with higher education change the investment implications based on private values only? This paper suggests that they do, but only for specialized types of higher education associated with economic growth production, i.e., with inventions and innovation. The paper also argues that some part of this public value is associated with international experience, which may be acquired in a higher education program in a developed country.

In this concluding section, I discuss three policy areas. The first is to review and refine public value calculations and relate them to costs. The second is the specialized nature of the calculations. Is it the case, for example, that a Ph.D. program in a developed country can be justified for an agricultural scientist, but not for an art historian? And third, how serious is the inherent risk of "brain drain" in international higher education programs.

Public Value Calculations

Private value calculations of returns to schooling show highest returns to primary schooling and literacy achievement, with lower returns to secondary schooling and lowest returns to college and graduate education. (However, see Paul Schultz's article, which reports high returns to college education for Africa.) In many low-income and low-TC countries, academic salaries are low, even when they include housing and related benefits. The added salary increments associated with completing a doctorate are also low. In low-TC countries, non-doctoral monthly salaries as low as $200 per month are not unusual, nor are increments to salaries associated with a doctorate of only $100 or $200 per month. As countries move to Group III and Group IV status, these numbers become much higher.

Clearly, an income stream increment of say, $200 per month cannot justify an international Ph.D. program investment. The present value of an income stream of $2,500 per year for 30 years is $24,000 using a 10% discount rate and $38,000 using a 5% discount rate. It is conceivable that these numbers could justify a domestic Ph.D. program but not a foreign degree program.

Can public values raise these numbers to more viable levels? And how do public values compare between primary, secondary, college, and graduate training? How do they compare between disciplines?

Consider whether the ratio of public value of an educated person changes the calculations based on private values. It is important to note that all workers generate "economic surplus." We normally associate this surplus with goods markets; but in principle, goods surpluses can be translated into factor market surpluses. The calculations based on inventions in Figure 1 are a case in point. Are public surpluses higher for workers with secondary schooling, college degrees, or graduate degrees? Are the public values/private values different? This paper suggests probably not, *except for inventors and innovators.*

For inventors/innovators, two sources of public value were identified. The first was illustrated in Figure 1 where "extra" economic surplus was associated with IPR system drive private sector inventions/innovations and with public sector underinvestment in research and possibly in extension (*B* in Figure 1).

Rate of return evidence suggested public value/private value ratios in the 2 to 4 range for extension type programs. Of this, the "extra" surplus might be in the 1 to 2 range. For invention/ innovation programs with larger pay-offs, the public value/private value ratios could be in the 5 to 7 range with the extra economic surplus being perhaps 3 to 5. Thus, for higher education programs producing inventors and innovators, one could reasonably multiply the private

values noted above of 24,000 to 38,000 by a factor of 3 to 5. This would bring them into the range of viability for international degree programs.

A second source of public value is associated with a shorter transition from one level to the next. As noted above, pursuing an aggressive technological capacity strategy could halve the time required to move from one level to the next; 23 countries actually moved in 10 years instead of 20. The associated growth dividend is an added 0.35% per year. If this growth required an increase in public and private educational spending of 1% of GDP, the added growth component would increase the extra public value/private value ratio for research from 3 to 5 to 4 to 6.

An additional source of public value is associated with the establishment of a training capacity in a developing country. India now has approximately 25,000 agricultural scientists in its public research system. A number of these scientists have graduate degrees from developed country programs, but most have graduate degrees from Indian universities. The quality of these Indian degree programs was at least partially the product of international higher education support programs. Many of the Indian degree programs had affiliations with U.S. land grant universities, and many faculty had obtained their degrees in earlier programs. Rockefeller Foundation programs in the social sciences were another source of support.

How much added public value is associated with the successful development of such degree-granting programs and the "leverage" created through students and through students of students? If each faculty member produces, say, 15 Ph.D. students over a career, the public value added can be quite considerable. At a discount rate of 10%, the present value of this contribution would roughly double the values calculated above.

It is also noteworthy that the effective conduct of agricultural research calls for international participation in the international science community. Almost all agricultural scientists working on rice in India have been to the International Rice Research Institute (IRRI), and all rice breeders in India use breeding germplasm produced by IRRI. The international system of rice nurseries administered by IRRI facilitates the use of this breeding germplasm. Science, applied science, and invention fields are inherently international in today's globalized world, meaning that practitioners must be linked to the leading institutions producing new science, applied science, and inventions.

Invention/Innovation and Fields of Higher Education

The argument presented for the extra public values calculated above is couched in growth-production terms. Which higher education programs produce "growth

producers"? That is, how are invention/innovation and technology acquisition skills acquired? And how does one weight the different fields of invention?

The arguments presented in this paper distinguished between specific invention/innovators and invention/innovation (In/Im) enhancing activities. TC enhancement entails a broader range of educational programs, including literacy achievement in primary and secondary educational programs. It also included college programs that support and spawn the growth producers. Many college programs support skill acquisition that is growth producing. But it is almost certainly the case that college curricula and fields of emphasis should emphasize the engineering-sciences and the "hard social sciences" more than the humanities relative to the curricula mixes in high-income countries.

The relative weight to different fields of invention activity should depend on the stage of development of the economy. For Group I countries with little industry, achieving agricultural productivity growth is of paramount importance. This is, first, because of the weight of agriculture in the economy and, second, because these economies lack the institutions and infrastructure to make anything else work. The experience of the past 50 years shows that Group I countries achieve TFP gains only in agriculture; and given limited investments, they achieve few gains there.

In Group II countries, agriculture also dominates TFP growth—but because they actually invest in agricultural research and extension. Many Group II countries have achieved agricultural gains from crop genetic improvement (CGI) or plant breeding inventions. The green revolution has reached many Group II countries but not many Group I countries, even though it is about their only option for growth. The Group II countries, however, receive considerable World Bank and other support for industrial growth. They do realize industrial growth but little industrial TFP growth. These countries do not acquire technology easily; and because the aid agencies have not stressed industrial R&D for these countries, their industrial growth comes at high cost.

For Group III countries, agricultural TFP growth is high and industrial TFP growth is beginning to emerge. They continue to underinvest in industrial invention, and most have great difficulty developing the IPR systems and associated institutions to move them into the rapid-growth class of the Group IV countries.

African countries face major challenges in upgrading their TC levels. Advanced training at the Ph.D. level is required. Nongovernment organization (NGO) programs have not invested in TC capacity, except marginally. Government support of higher education is required.

International Experience, Migration, and University Development

Investment levels in general science, the applied or pre-invention science and in R&D invention/innovation programs are such that developed economies are the natural originators of science findings and of inventions/innovations. The OECD countries share in this originating leadership role. Developing countries range from the Group I countries, who are largely outside the system except as buyers of products embodying inventions, to the Group IV NICs (and potential NICs) who specialize in adapting OECD inventions to meet demands in their own and upstream markets.

Yet for all TC levels, there is value to international experience, including obtaining degrees in developed country programs. For Group I and Group II countries, this is largely due to the fact that domestic programs, even at the M.A. level, are often not really available. For Group III and Group IV countries, even if good programs are available, there is added value in the international experience: the opportunities to observe and learn from originators.

The risk associated with international experience is that the potential inventor/innovator will not return. The brain-drain problem has been a factor for decades; and if anything, it is getting more severe as the income differentials between OECD countries and Group I and Group II countries widen. (See Kenneth Prewitt's article on replacement migration in this volume.) Past experience suggests that brain-drain problems are most severe in Group I and Group II countries and not too serious in Group III and IV countries.

Implications for Africa

Aid agencies provided vital support to high education programs in the 1950s, 1960s, and 1970s. This support enabled significant advances in technological capital in many Latin American and Asian countries. Less success was achieved in Africa in this period, at least partly as a result of Africa's inherited higher education capital.

In the 1980s and 1990s, aid agencies downgraded higher education support programs. They also implemented changes in development objectives, notably in the "sustainable development" movement that further downgraded the role of higher education programs, by stressing regulatory programs over invention/innovation programs.

This paper has argued that the TC route is the only practical route to income improvement. Many programs to increase the provision of public services have effectively improved real incomes by lowering the prices of such vital services as, for example, health care. But the escape route from the mass poverty now endemic in most African countries is improved income. This means invention

and reinvention, innovation, and reverse engineering. Such processes require skills that can be produced only in higher education programs.

Notes

1 All factors of production can be thought of as having produced consumer surplus. In Figure 1 the area A is normal producer surplus. The area B is added surplus associated with IPR protection.

2 The section on "Dynamic Technology Capital Issues" below reviews the evidence from rate of return studies for agricultural inventions. It suggests that, at least in developing countries, areas A and B are large relative to P (3 to 5 times as large) and that the "extra" public value B is probably quite large (2 to 4 times P).

3 The Plant Patent Act (1930) provided patent protection to asexually reproduced plants, but it was not regarded as a major incentive for private sector breeding. In 1970, the Plant Variety Protection Act extended this protection to sexually reproduced plants. In the 1980s conventional patent protection was extended to plants and animals.

4 Many African countries "inherited" Class I Technology Capital from their colonial mother countries, and many have remained in Class I. (See Table 5.)

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Alternative Models to Traditional Higher Education: Market Demand, Networks, and Private Sector Challenges[1]

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Abstract

This paper looks at the pluralization of knowledges and knowledge-producing institutions and at the complexification of the higher education systems in sub-Saharan Africa. It highlights the evolution of "traditional" institutions and the factors that led to such an evolution, the development of alternative models, the spread of knowledge networks, and the challenges of private sector involvement in higher education. With globalization, liberalization, and democratization came new "modes" of higher learning, and new kinds of knowledges. "Traditional" models have been forced to evolve, adapt, and reinvent themselves in the context of these changes, and of shifts in development paradigms and rapid global and local economic and technological transformations. There seems to be a gradual evolution towards more hybrid forms and models of higher education. However, the paper argues that, despite the rapid increase in the numbers and variety of institutions and the pluralization of knowledges, both the traditional institutional forms and modes and the traditional kinds of scientific knowledge are, in the case of Africa, likely to remain the dominant forms for the foreseeable future.

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Résumé

Cette contribution aborde la question de la pluralisation du savoir et des institutions de production du savoir, mais également la question de la complexification des systèmes de l'enseignement supérieur en Afrique subsaharienne. Il met en lumière l'évolution des institutions « traditionnelles », et les facteurs ayant mené à une telle évolution, de même que le développement de modèles alternatifs, l'extension des réseaux de savoir et les défis posés par l'implication du secteur privé dans l'enseignement supérieur. La mondialisation, la libéralisation et la démocratisation ont entraîné avec elles de nouveaux «modes» d'apprentissage et de nouvelles formes de savoir. Les « modèles traditionnels » ont été contraints d'évoluer, de s'adapter et de se réinventer dans le contexte de ces changements et des évolutions en matière de paradigmes de développement, mais également dans le contexte des rapides transformations locales, économiques et technologiques. Il semble y avoir une évolution progressive vers des formes et des modèles l'enseignement plus hybrides. Cependant, l'article affirme que malgré l'augmentation rapide du nombre et de la variété des institutions, et malgré la pluralisation du savoir, les formes et modes institutionnels traditionnels, ainsi que les formes traditionnelles de connaissance scientifique pourraient bien conserver leur place dominante dans un futur proche pour ce qui est de l'Afrique.

Higher education in Africa is often seen as a developmental issue, and development was conceptualized as a process that should lead African and other developing societies to the level of development of Europe and North America today. Education (especially higher education) was both a sector to be developed and an instrument in the development of other sectors. As development paradigms have shifted, so have the conceptions of higher education and its status and role in the so-called developing countries. Higher education systems have become more complex and more diversified, as globalization, liberalization, the development of new technologies, and a number of other changes in the social, economic, and political environment have unfolded. This paper looks at the pluralization and complexification of the higher education landscape in Africa , highlighting the evolution of the "traditional" institutions, the development of alternative models and the spread of knowledge networks, and the challenges of private sector involvement in higher education.

The Problem

A wide range of policy changes has developed in African higher education. During the initial postindependence period, there was a great deal of enthusiasm for higher education. This was followed by a phase when higher education

was not a priority, due to severe economic crises and the subsequent implementation of structural adjustment programs (SAPs). Today, knowledge is said to be as important a factor of production as physical capital. In *Higher Education in Developing Countries: Peril and Promise,* the Task Force on Higher Education and Society (2000) argues, "The world economy is changing as knowledge supplants physical capital as the source of present (and future) wealth" (p. 9). Similarly, a recent World Bank report (2002: 1) draws attention to the "increasing importance of knowledge as a principal driver of growth" (p. 1). Knowledge has long been recognized as both a resource and a source of power in local and global relations. The rediscovery of its importance in recent years, including for developing countries, is likely a result of the information revolution, which is clearly knowledge based and knowledge driven.

Much of modern day research-based knowledge is produced and transmitted across generations in higher education institutions. The growing importance of knowledge makes higher education more important than ever, as a World Bank (2002: 1) report indicates:

> The role of education in general and of tertiary education in particular, is now more influential than ever in the construction of knowledge economies and democratic societies. Tertiary education is indeed central to the creation of intellectual capacity on which knowledge production and utilization depend and to the promotion of the lifelong-learning practices necessary for updating people's knowledge and skills.

But what kind of tertiary or higher education are we talking about, and where and how is it being delivered?[2] Higher education systems are made up of three elements: the institutions of higher education; the organizations directly involved in financing, managing, or operating higher education systems; and "the rules that guide institutional and individual behavior and interactions among the various actors" (Task Force 2000: 46).

In Africa in the 1960s and 1980s, the public universities were almost the only institutions of higher education and research. The university therefore became a multi-purpose institution which has evolved well away from its original design as a liberal arts college: It functioned as a professional education institution and as

> an institution for mass undergraduate training, extra-mural studies, graduate education, high level research, functions that in more advanced settings are typically handled by a system of separate, but interdependent institutions. Consequently, national higher education systems in Sub-Saharan Africa may be stylized as thin and undifferentiated. At their

> heart lies one or a few institutions expected to discharge a wide range of functions relating to learning and knowledge creation. (Fine 1997: 6–7)

In the 1970s and 1980s, several regional knowledge networks were created, partly as a consequence of the crises of the universities. In the 1980s and 1990s, higher education institutions became much more diversified, as private universities, independent institutes, professional schools, and other degree-granting institutions mushroomed. The links between these different tertiary education institutions are extremely complex.

With globalization, liberalization, and democratization also come new modes of higher learning and new kinds of knowledge that are more problem oriented than the knowledge produced in the traditional higher education and research institutions (Kraak 2000a). There has been a great deal of interest in these new modes, variously referred to as "Mode Two" or "Alternative Models" (Gibbons, 2000; Gibbons et al. 1994; Kraak 2000a; Kraak 2000b; World Bank 2002). The discussion on higher education is therefore partly centered on: (a) the institutions of education and research, (b) the kinds of knowledge, and (c) the modes of its delivery. Institutions are sometimes classified according to the kinds of training (academic or vocational) or knowledge they offer or the modes of delivery; for instance, there is a distinction between "contact" and "distance teaching" universities. An emerging trend that is likely to become more and more important, however, is one of mixed modes in which the same institutions engage in both contact and some form of distance teaching and in producing various kinds of knowledge. As traditional models evolve, adapt, and reinvent themselves, there seems to be a gradual evolution towards more hybrid forms of higher education institutions.

However, in Africa, a recent series of workshops and seminars and a number of recent studies and inventories of the social sciences pointed to both a rapid increase in the numbers and variety of institutions and a pluralization of knowledge, and to the continued dominance of both the traditional institutional forms and modes, and of traditional kinds of scientific knowledge (Sall, Yap, & Fellerson 2002).[3]

Thus, in Africa, the traditional forms of higher education and scientific knowledge are likely to continue to be the dominant forms for the foreseeable future. This is partly due to the fact that two key factors in the current transformation of knowledge systems worldwide—access to new information and communications technologies and the rates of Internet connectivity and enrollment in higher education—are much lower across Africa than in other regions. Moreover, sub-Saharan Africa is characterized by poverty, whereas the capital investments required and the recurrent costs of the new technologies that are revolutionizing the higher education field are extremely high (World Bank,

2002: 39). This is one reason why the discussion on university education reform has centered on ways to address the fiscal challenges, i.e., to mobilize the financial resources needed merely to operate, let alone revolutionize, higher education institutions. Government funding is largely devoted to establishing the basic infrastructure and covering recurrent costs, and there also is a heavy dependence on external donor funding. Private sector involvement in funding higher education is still marginal, although it is gradually increasing. The new public and private institutions, like the emerging knowledge networks, have so far been playing a complementary role to that of the traditional institutions. However, with the twin processes of adjustment and political liberalization, the rules governing the higher education system are evolving, and there are important changes taking place in the traditional institutions as well.

To understand these complex relationships and challenges before making policy recommendations to strengthen the role of higher education in the development enterprise across Africa, we need to ask: (a) What are the driving forces behind the emergence and spread of the alternative models of higher education? (b) How are the various higher education models affecting the capacity of African societies to produce an intelligentsia for themselves, one that is capable of helping Africa think through the current crises and face the challenges of globalization and development?, and (c) What kinds of impacts are the higher education models having on Africa's overall development process?

Much of the recent literature on the transformation of the higher education sector in both the industrialized and developing countries suggests that the process is demand driven, at least in part. There are various kinds of demand. Demand for higher education results from the proliferation of basic education with larger numbers of students who complete high school. With the increasing number of students comes a demand for higher education institutions that can develop, teach, and certify higher order skills. And of course, there is a demand for graduates, both highly specialized and generalist. All this comes under market demand, a concept I return to later in this paper.

What is certain, however, is that a wide range of factors can account for the changes. The demand for higher education and higher education institutions is extremely high and much more varied than it was in the early 1960s, before we entered the current phase of globalization and before the information technology (IT) revolution. Higher education systems have been responding to the pressures in various ways. Some, if not most, of the changes in the higher education systems resulted from attempts to adapt and survive in the face of new challenges; and in some cases, institutions have attempted to exploit new opportunities. In most SSA countries, government policies in the field of higher education have been much more reactive than proactive. Yet there now seems

to be an emerging consensus on the need for well thought out and carefully framed state policies to govern the higher education systems in ways that maximize the public good while enabling institutions to perform both traditional and new roles to respond to public and private demands emanating from a wide range of actors.

The public university remains the dominant feature of the higher education landscape in Africa, although this situation is changing as private (commercial, religious oriented, and other kinds of institutions) begin to equal and, in some cases, even outnumber the state universities. This is the case in Sudan where there is one public and 24 private, mostly Islamic, universities (Szanton & Manyika 2002: 7). This is happening in Uganda (Kwesiga et al. 2001), Zimbabwe (Nhema 2000), Senegal, and elsewhere. The dominance of the public university is, however, not only numerical; it is also strategic in terms of the type and quality of teaching and research being offered and in terms of the nature of the relationships linking them to the private institutions. I would, therefore, further argue that developing plural and well-managed higher education *systems* centered on public flagship universities, with adequate resources, is one of the realistic (and most needed) policy options for Africa. There is a need both for multi-institutional public systems, and for the multitasking, multilevel research-cum-teaching university also known as the "flagship" university.

Traditional Higher Education

In this section I look at the expansion of traditional higher education in sub-Saharan Africa and show that this process was part and parcel of the state, nation-building, and development processes in the postcolonial era.[4] The processes were interlinked and were perceived by the elites of Africa as necessary to mutually reinforce one another (Ajayi et al. 1996; Hagan 1994; Samoff & Carrol 2002; Mkandawire 1999; Sawyerr 2002). As Samoff and Carrol (2002) have noted:

> Education would not only make [a] new society but would also shape the new people who would inhabit and manage society. . . . As the capstone of the education system, higher education had a special place in that vision. Universities were to educate the thinkers and inventers, the policy and decision makers, the teachers of the teachers, the leaders of the leaders. (p. 7)

By traditional higher education, I mean education dispensed in tertiary education institutions such as public and private universities, colleges, polytechnics, professional training schools and the French Instituts de Formation Professionnelle (IFP), previously called Instituts Universitaires de Technologie

(IUT). It follows from the description of the situation in the previous section, therefore, that traditional higher education, for most Africans, would be university education; and most universities were, and still are, public universities.

The institutional base for knowledge production was very narrow during the first decades of independence. Higher education in Africa is a postcolonial phenomenon. At the time of independence, or roughly the late 1950s and early 1960s, the total number of universities and university colleges in sub-Saharan Africa, outside of South Africa, was fewer than 10. In its 1999 *Guide to Higher Education in Africa,* the Association of African Universities (AAU) identified 174 institutions officially designated as universities in the 40 countries of sub-Saharan Africa (AAU 1999; Sawyerr 2002); Today, there are some 175 universities in sub-Saharan Africa, and The Gambia, which was not included in the AAU survey, is also now developing a university (Szanton & Manyika 2002: 7). These institutions are very unevenly distributed within sub-Saharan Africa: South Africa and Nigeria together account for almost half of the sub-Saharan Africa universities. According to the AAU *Guide,* 26 of the countries it covers indicate that they have only one or two universities, almost all of which are public or state institutions.

The explanation for this exponential growth is partly in the fact that the university was "a fruit of nationalism" (Mamdani 1998: 2). It became one of the symbols for independent statehood. "Along with a national flag and a national anthem, a national university came to symbolize national independence" (Mamdani 1998: 2). However, probably more important than the symbolic value of the university were the high hopes that the leaders of the independence movements placed in this institution. Independence was sought (and fought for) as a necessary step towards the elimination of poverty, ignorance, and disease. The fight against these ills became a real obsession for many independence leaders. It was assumed that "poverty and exploitation could be defeated by social action" and that "such action could only be facilitated by social science knowledge" (Mkandawire 1999: 28). A premium was also placed on science and technology.

Whichever way one looks at it—as a symbol of independent statehood, as a useful instrument for human capital formation and for fighting poverty and ignorance, or as a site for knowledge production—the university of the newly independent states was bound to be a public institution, especially as the indigenous private sector was extremely weak. The state took upon itself to provide education and therefore established as many basic and higher education institutions as it possibly could. From the "one country, one university syndrome" (Mamdani 1998), many countries now have several universities. Nowhere else

is this spectacular development more visible than in Nigeria where there were only two universities at the beginning of the 1960s: Ibadan, created in 1948, and Nsukka, symbolically inaugurated the day after independence was obtained in 1960 (Ajayi, Goma & Johnson 1996; Lebeau 1997). Now Nigeria has 44 universities, only five of which are private; the rest are public universities (federal or state universities).[5] South Africa is another case of a country with many higher education institutions: 21 universities and 15 technikons, one of which is private.[6] Some foreign universities have begun operating in South Africa—for example, the Australian National University and the University of London. There is, however, a sense among academics that these foreign universities are not collaborators but predators that steal teachers from the local (public) universities.

One effect of the "one country, one university" syndrome was the fragmentation of the higher education sector. Many universities were originally intended to be regional higher education and/or research institutions. The University of East Africa, some of whose constituent colleges were originally founded in the 1920s, became three distinct national universities in Uganda, Kenya, and Tanzania. The University of Dakar was founded in the late 1950s, as a regional university; but following independence, each of the francophone West African countries also created its own university. The Makerere Institute of Social Research in Kampala, and the Dakar-based Institut Fondamental d'Afrique Noire both started off as regional institutes for East and West Africa respectively. They no longer serve this purpose. Language and regional barriers made the fragmentation even more critical and inhibited the growth of lively communities of research and publishing and access to scholarly works produced in different countries, subregions, and languages.

State creation and support for public universities later turned out to be a mixed blessing. From being a symbol of independent statehood, the university became both an instrument and a site for patronage politics. Moreover the "one nation, one university" syndrome brought academics face to face with the state, which often regarded critical scholarship with apprehension, and sometimes outright suspicion. Frequent confrontations occurred between the state and academics (CODESRIA 1996; Mamdani 1998; Mkandawire 1997). The postcolonial state was highly centralized with power concentrated in the hands of the head of state and the few people around him. It had a literal aversion to critical thinking. Academic freedom was, therefore, often violated through both state harassment and neglect.

Another great challenge to African higher education and research, however, was the restriction of the institutional autonomy of the universities. According to Ajayi et al. (1996: 95)

> The governments cared much less about the curricula than about administrative control—the appointment of the Chancellor, members of the Council, Vice-Chancellor and, if possible, deans and Heads of Department. The aim was to ensure political support or, at all events, to eliminate opposition within the university community.

Open contestation of the very concept of academic freedom occurred in the context of newly independent, developing countries, including by some of the most highly respected leaders such as Kwame Nkrumah of Ghana (Diouf & Mamdani 1994; CODESRIA 1996; Mkandawire 1999).

> The newly established independent governments made their impact felt in asserting their sovereign rights to own and to control their universities. This was made manifest in the failure to sustain attempts to create inter-territorial or regional centers of higher education. The intention of governments in seeking to control the universities was usually stated as being to make them more responsive to development plans (Ajayi et al. 1996: 95)

For a time, calls for academic freedom and institutional autonomy came mainly from expatriate academics. Many local academics tended to both sympathize with the leaders of the country and to favor the Africanization of the university, which was seen as both a part of and a factor in the process of Africanization of the state, the administration, and of other institutions.

However, with all its problems, the public university did provide the services expected of it. Enrollment rates, although far below what they are in the industrialized countries and in other regions of the developing world kept rising (World Bank 2001). Even in the worst years of the crises (roughly the mid-1980s), the social value of the university degree remained quite high, judging by the growing numbers of secondary school graduates seeking admission to the university (Sall, Lebeau & Kassimir 2002). Nigeria's universities and polytechnics «barely admit up to 20% of qualified candidates annually» (Amuwo 2001: 18). Universities were unable to cope with the rising demand, especially as state funding dwindled. Aggregate funding to federal universities during 1980–1985, (i.e., just before structural adjustment programs and policies were introduced) was 2.7 billion Naira,[7] comprising 1.7 billion Naira in recurrent grants and 1 billion in capital grants. By 1987, the recurrent grant to the universities was reduced to just 30% of the original amount. By 1989, the grants available to the universities were only sufficient to pay staff salaries. The decline in funding was also evident in terms of allocations per student (in constant Naira): from 3,424 in 1975–1976, to 536 in 1988–1989. According to the

National Universities Commission of Nigeria, subsidies per student declined from N697 in 1991 to N362 in 2000 (Agbu 2001).

This reduction of their resources, at a time when student populations were increasing, put the universities in extremely difficult situations. The financial and governance crises had negative impacts on infrastructure, on the quality of training and research, and on the market value of the university degrees. At the same time, currencies were losing value. Basic commodities and services becoming less and less affordable, even for university lecturers.

Responses to the crises took several forms, and the responses themselves have in some cases given rise to new problems. First, the reform of the higher education sector was included in the structural adjustment packages of the 1980s and 1990s. Only in a few cases were the reform measures designed in a more or less participatory way (involving academic staff associations, at least in the planning stages, as was the case in Senegal). The higher education sector reforms had varying degrees of success. Senegal, Tanzania, and Uganda are often cited as relatively successful cases. The main criteria for gauging the success of the reforms include funding, diversification of courses, and the subsequent improvement of academic staff salaries. From being totally dependent on state funding for its running costs, Makerere University now generates more than 30% of its revenue internally (Task Force 2000: 54; Mukuma 2001: 107–111). One of the key measures taken to generate revenue was "the establishment of a quota of fee-paying students over and above the number supported by the government subvention" (Sawyerr 2002: 47). Makerere also benefited from very generous donor support. The experience is not, however, without its own problems, which include the decline of the quality of courses and degrees to the extent that the university is now ranked behind two of the new and small private universities in terms of the quality of the education; worsening inequities in access and the widening of the gap between so-called "achieving" university faculties and departments (i.e., those able to generate revenue by charging fees and expanding student intake or by attracting donor funds) and the "nonachieving faculties" (e.g., the faculty of medicine, where student in-take has to be strictly controlled to maintain quality). Moreover, 60% of the funds still come from the government of Uganda.

Second, at the individual level, lecturers remaining at African universities resorted to consultancy, petty trading, teaching extra classes, etc., in order to earn the equivalent of a few dollars. Others established independent research centers and NGOs and tried to access donor funding. Many of the universities have been trying to regulate the craze for consultancies but have met with limited success. Among the serious consequences of this condition are the fur-

ther shortening of time for research and the gradual decline of the quality of teaching.

Third, many of the universities have opened satellite campuses and offered courses and degree programs such as MBAs for fee-paying students, leased out parts of campus premises to private companies, rented out buildings acquired in the earlier period of relative prosperity, and so forth. However, like the spread of franchise universities and "off-shore campuses," the establishment of satellite campuses is a practice that one finds in almost all regions of the world (World Bank 2002: 33).

Fourth, regional knowledge networks have taken on some of the graduate training and set up national and regional research networks among scholars by field or issue, hold workshops on methodology and how to strengthen research capacity for more junior scholars, sponsor summer institutes and fellowship programs for more senior scholars, and undertake scholarly publishing (including textbooks), etc. to support engagement in broader scholarly debates.

Alternative models to the traditional higher education system have emerged as a result. But before examining these alternative models, I would like to say a few words about the market demands and the networks that appeared in response to some of the demands and challenges.

Market Demands and Networks

I take "market" here to mean not only the labor market but also, more generally, the market for higher education and the market for goods and services produced by higher education institutions. The "goods" produced by these institutions could be public or private.

Market Demands

Traditional higher education institutions were mainly seen as benefiting "the nation" as producers of public good. The latter may include the response to private demands of individuals for training or of companies for trained human power (Sall, Lebeau & Kassimir 2002). Hence the state plays an important role in setting them up and supporting them. Even the World Bank (2002) now argues that "continued government support of tertiary education is justified by three important considerations: the existence of externalities from tertiary education, equity issues, and the supportive role of tertiary education in the education system as a whole" (p. xxi). Notwithstanding such recognition of the critical public roles that they play, higher education institutions are moving toward a model where they are seen more and more like business enterprises. This development is definitely a sign of the times, a manifestation of a major paradigm shift.

In Africa, the entrepreneurial university, "characterized by increasing market-like behavior and governance" (Subotzky 1999), is a phenomenon of the 1990s and the postadjustment years. Much of this new development is part of the global neo-liberal consensus, which, for Africans, came in the wake of the structural adjustment programs. It could also partly be attributed to the information and communication technology (ICT) revolution. The defining principle of the entrepreneurial university is the adoption and spread of market principles in the management and actual functioning of higher education and research institutions. Subotzky (1999) has argued: "Within the neo-liberal global consensus, this primarily serves the market and the private good." These developments pose a challenge to the traditional public universities who are faced with "new missions, new demands, and new competitors" (World Bank 2001: 6). The impact can also be felt in the practice of data processing and analysis, in publishing, in access to documentation, and in the management of libraries (Altbach & Teferra 1998). The latter now involves not only the management of stocks but also the management of flows of information, including both raw and processed data.

As for the supply side of the equation, not only have private universities entered the scene, but public universities are also now confronted with reduced budgets and increasing demands for rationalization and marketability. The primary roles of the public universities in serving the public good, reproducing elites, producing and disseminating knowledge, and providing services to individuals, groups, and the nation-state and its different constituents (communities, the private sector, and, more recently, the plethora of nongovernmental organizations) have, however, hardly changed. If that is the case, then what has changed?

When the market is defined as young people in search of higher education opportunities and parents looking for educational opportunities for their children, the demands have not changed in nature. What have changed are the kinds of courses, training, and degrees now in high demand, and the scope and massification of the demand for higher education. This change could be seen as a measure of success for the postcolonial state: The numbers of secondary school graduates have increased tremendously, partly as a result of the spread of basic education. The traditional university's adaptation process has been much slower than the rise in the demand, often resulting in overcrowding and massification (Task Force 2001). The quality of the goods and services provided by the traditional institutions has also become unsatisfactory, except in a few disciplines and branches. In many countries, there are thousands of unemployed degree holders. Amuwo (2001: 19) cites a World Bank report that "graduate skills have steadily deteriorated over the past decade" yet, "most astonish-

ing in this report is the claim that the number of graduates in Nigeria outstrips the absorptive capacity of the economy." This would mean that the 60 higher education institutions in Nigeria that, together, "barely admit up to 20% of qualified candidates" are "overproducing" graduates.

More important, however, is the challenge to the traditional idea of the university that is implicit in such statements. This challenge is also implicit in the fascination for the so-called "Mode Two" types of knowledge and higher education institutions referred to at the beginning of this paper. The focus is on graduate unemployment, which is seen as proof of the failure of traditional higher education. The solutions to both graduate unemployment and to the rising demand for higher education are said to be not only in the transformation of the traditional institutions into more entrepreneurial institutions but also in the promotion and development of alternative models, mainly of the Mode Two kinds. This approach is also supposedly the way to solve the problems of access to higher education, while preparing Africa for a better position in the global economy. These arguments are certainly pertinent in some respects. What they fail to address, however, are the problems of equity that become more critical when high fees are charged by public or private universities and colleges; the devaluation of basic research that has resulted from the wild craze for marketability in both the public and private institutions; and the fact that higher education is definitely not the only cause of labor market problems.

Moreover, the fact that Nigerian higher education institutions, for instance, "barely admit up to 20% of qualified candidates" could also be an indication of excess demand. There is, therefore, a lot of room for private sector involvement, and there may well be business opportunities in higher education that the private sector could fill. These opportunities became more important as both the fiscal crises of the state and the subsequent implementation of structural adjustment programs restricted public spending on higher education. Private sector involvement leading to the establishment of private higher education institutions would be a way of absorbing the excess demand, but the consequence could well be the production of larger numbers of graduates than the economy is able to employ unless there are structural changes leading to the creation of additional employment opportunities. The development of different curricula, or different types of training or levels of degrees, increases the chances of new graduates finding jobs.

The market has been unable to provide adequate solutions to Africa's problems. Higher education and research are less likely to be areas where market solutions will work. As the authors of the Task Force on Higher Education and Society Report (2001: 11) said:

> On its own, the market will certainly not devise [quality higher education systems]. Markets require profit and this can crowd out important educational duties and opportunities. Basic sciences and the humanities, for example, are essential for national development. They are likely to be under-funded, unless they are actively encouraged by leaders in education who have the resources to realize this vision.

In its report, *Constructing Knowledge Societies: New Challenges for Tertiary Education,* the World Bank (2001) makes similar arguments in favor of continued state support to higher education. Makerere University in Uganda is one of the institutions that took the lead in adopting market principles of management as a way of coping with the financial starvation that it faced in the 1970s and 1980s. According to Mahmood Mamdani's (2001) keynote address to the social science faculty at Makerere University:

> The tendency was to expand courses for programs for (which) there was market demand, and shed courses and demands for which demand lagged. In the process, the student body got differentiated between those who didn't pay fees and those who did, with different entrance requirements for each group, just as programs began to be differentiated between daytime courses for students on scholarships and evening courses for fee-paying counterparts. The more these trends gathered momentum, the more higher education turned into a contract between the university and the fee-paying student, and less between the university and society. (Quoted in Mukuma 2001: 14; Mamdani, cited in Mukuma 2001: 14)

An entirely demand-driven approach to higher education is quite hard to imagine, especially as both the state sector and industry, which are the two main sectors expected to generate the demand in Africa, are bedeviled with problems. Examples of marketable courses or disciplines often include medicine, engineering, computer science, and business administration. However, unemployed holders of these degrees can be found in Senegal, Morocco, and several other countries. The problem, therefore, is not only with the university or the type of higher education being provided, but also with the nature and size of the market. The diversification of higher education institutions and types of knowledge is probably a response to market demands but only in part.

Networks

Networking is an important part of research and knowledge production and dissemination. In Africa, many of the research networks came into being in the 1980s and 1990s as a response to the difficulties being encountered by univer-

sities. Foreign donors established some of these networks. Others came out of indigenous initiatives. The latter include the Council for the Development of Social Sciences in Africa (CODESRIA), a regional social science network established by African public universities and institutes in 1973. CODESRIA's main objectives were to promote social science research and research-based publishing in Africa and to overcome the linguistic barriers inherited from colonialism. Other regional networks and discipline-based associations shared these objectives. These networks became not only important sites for knowledge production and extremely lively debates, but also important actors in the forging and strengthening of a regional scientific community (Mkandawire 1997, 1999).

The networks have gradually developed into institutions that established and coordinated several other research networks. They also initiated several research capacity strengthening projects. After having benefited from much donor support, the role of networks has recently been the subject of debates again, especially as universities appear to be regaining some of the momentum that they lost in the crisis years. Donors are now keenly interested in supporting universities whose role in the production of knowledge and in human capital formation for the global economy is crucial. The role and relevance of the networks is therefore being questioned and their links with the universities debated.

Yet with the possible exceptions of the African Economic Research Consortium (AERC), and the Association of African Universities (AAU), there is little really known about the actual contribution of regional research councils and networks to the development of national research capacity or the uses of the research generated. Besides evaluations conducted for the agencies that fund them, there are few systematic studies on this issue (Prewitt 1998). In 2001, the Department for Research Cooperation of the Swedish International Development Cooperation Agency (SIDA/SAREC) decided to support a study on the role of regional social science councils in the promotion of research and scholarly publishing in Africa undertaken by CODESRIA, the Southern African Regional Institute for Policy Studies (SARIPS), the Organization of Social Science Research in Eastern and Southern Africa (OSSREA), and the African Association of Political Science (AAPS).

In the debate on the role of networks, it is sometimes argued that their work should be demand driven—that the universities, research institutes, and centers should set their agenda. It is true that the networks and other regional bodies ought to be responsive to the needs of the universities. However, historically, the networks have been very proactive in their attitudes towards the universities, identifying problems and needs and initiating programs to support them. This characteristic led them to organize capacity-building and strengthen-

ing workshops, M.A. programs in certain disciplines, small grants programs for thesis writing, and research networks at both the national and regional levels. These networks bring together young scholars and senior academics and provide opportunities and space for mentoring and intergenerational transmission of knowledge. Networks have also been very important in providing space for free inquiry and for the defense of research freedom. Equally important is the fact that some of these networks have worked very hard to support the emergence of strong regional and local scientific communities to be in a position to engage policy makers and civil society over both local and global issues.

Sustainability is the key challenge facing all of the networks. Few of the regional networks are making serious efforts to access funds from African governments or the African private sector. If African governments supported indigenous research and autonomous intellectual voices from within the region, they would open more possibilities for obtaining a better knowledge of the range of policy options available to them. Outside of a few countries, such as South Africa and Nigeria, support to regional knowledge networks might be easier to channel through regional bodies such as the African Union and the United Nations Economic Commission for Africa, and subregional intergovernmental bodies such the Economic Community of West Africa States (ECOWAS), and its Southern African equivalent, South Africa Development Community (SADC).

For the national and civil communities, the demand on the higher education and research institutions is a demand for explanations and solutions to the problems of poverty, insecurity, etc. Unrealistic as it may appear, this expectation of higher education is very real. It is a demand on the intelligentsia and their institutions for assistance in making sense of what is going on in the world around them. A few years ago, the Senegalese press ran a debate on what was called the breakdown of intellectuals ("la panne des intellectuels") who were seen to have failed in providing solutions to the economic and social crises on the continent. Higher education and research institutions are therefore expected to play important public roles. State funding for higher education is mainly based on the understanding that there is public good in higher education (Singh 2001; Jonathan 2001; Subotzky 1999).[8]

The combined effects of globalization, market demands, and other influences on higher education and the various types of responses to these processes have produced a new higher education landscape in Africa. It is one that is becoming increasingly diversified, where institutions and scholars of different generations, different kinds of knowledge, different institutional models, and different modes of delivery coexist. The institutional base of higher education has changed, faculty demographics have changed, and the IT revolution

has caused a paradigm shift in higher education, its aspirations, and its real capacities.

Pluralization, Alternative Models, and Mixed Modes

Nowadays, the very mission of the university is being seriously debated. In the 1960s, the emphasis was on training, mostly in government-owned or -controlled institutions. The 1970s and early 1980s witnessed a significant expansion of academic research capacity both within and outside of the universities, particularly with the spread of knowledge networks and organizations that are owned by the academic community itself. However, the research capacity of a number of universities and university-based institutions and centers was seriously affected by the crises of the 1980s. The networks managed to survive and ease the strain on research budgets by mobilizing donor support. The challenge for both the university and the research institutes and centers is to maintain but rethink their basic or traditional functions, adapt to the new context, and live up to the new challenges.

Issues of governance and sustainable resource bases have become extremely important in the discussions on universities (Carlsson & Wohlgemuth 1996; Wohlgemuth 2002). With the crises and structural adjustment, the universities are faced with the challenges of having to go through deep reforms that may entail the rethinking of their very mandate. Much of the discussion on the need for reform is, however, put in fairly narrow managerial terms, losing sight of the traditional role of the university and of the fact that, historically, as providers of the public good, most universities survived on subventions from the state, grants from private foundations, or both.

Issues of quality and relevance are at the center of most of the discussions about universities and the social sciences. African scholars have been quite mindful of their social relevance and responsibilities. These days, in policy debates and general public discussions, the production of marketable goods, (i.e., works, courses, and graduates) tends to be given priority over academic excellence. In other words, academic excellence is defined more and more by government policy makers in terms of the marketability of the courses and of the outputs (graduates, etc.). If demand in its fullest sense were considered, the market would gauge not only quantity and utility but also research quality through peer review. “Relevance” today tends to imply what can be of immediate “use” or can be “counted.”

Across Africa, there has been a dramatic pluralization of types of knowledge and knowledge-producing institutions and sites in recent times. Over the years, universities have lived through different kinds of relationships with the state. The colonial administrations established universities affiliated with met-

ropolitan universities. Those of the former British colonies began as affiliates of the University of London, while Dakar was linked to Bordeaux, France. In the settler colonies of Mozambique and Rhodesia (now Zimbabwe), universities began as exclusive institutions for the children of settlers. Some of the constituent colleges of the University of East Africa (UEA), such as Makerere College, were founded in 1923 to offer vocational and professional training (Kwesiga et al., 2001). All became national universities when the countries achieved independence; and in 1970, the three campuses and constituent colleges of UEA became three independent national universities (Dar Es Salaam, Makerere and Nairobi).

The roles assigned to the universities changed with independence and, like the newly established universities of newly independent states, participation in the Africanization of administrations, nation building, and development was seen as a primary task. The roles changed again with the introduction of structural adjustment policies in the mid-1980s, with the end of the Cold War, and with the political liberalization of the late 1980s and early 1990s. For the 21 South African universities, the major changes occurred with the official abolition of apartheid and the inauguration of majority rule in 1994. The major differences between historically White universities and historically Black universities are, however, likely to persist for some time. The recent attempt to force some of them to merge with one another is just one of the policies being tried to transform the whole of the South African higher education system and to rid it of the legacy of apartheid.

Second, there has been a diversification of tertiary education institutions. A World Bank (2001) strategy document discusses the emergence of new kinds of tertiary education institutions. The bank distinguishes the traditional institutions (mainly public universities) from those that emerged in two subsequent waves of institutional development:

> Over the last two decades, many countries have experienced a remarkable diversification of their tertiary education sectors [as the first wave]. The appearance of a variety of new institutions alongside the traditional universities—short-duration technical institutes and community colleges, polytechnics, distance education centers, and open universities—has created new opportunities to meet the growing social demand. . . .
> A second wave of institutional diversification is now discernible with the emergence of new forms of competition in tertiary education that transcend the traditional conceptual, institutional, and geographical boundaries. The new actors in the "borderless" tertiary education market are . . . (a) virtual universities, (b) franchise universities, (c) corpo-

> rate universities (media companies, libraries and museums, and other institutions), and (d) education brokers. On the heels of these new actors come software producers, publishers, entertainment firms, and others seeking to tap the potential of an emerging international market in tertiary education. (World Bank 2002: 32-33)

The "second wave" of diversification gave birth to a fifth generation of institutions, such as virtual, franchise, and corporate universities. These came well after what have been called (a) colonial universities, (b) independence and development universities, (c) crisis era universities, and (d) entrepreneurial universities (Aina 1998; Mkandawire 1997 1999; Martin & West 1999; Tadesse 1999). These generations do not entirely replace one another. The birth of new generations, however, forced the older ones to reexamine their ways and adapt to the new situations.

With the increasing use of IT in higher education and in academic research, there is also a gradual shift away from the dominant university paradigm that is based on the idea of physical contact between students and teachers, among students themselves, and among scholars on a given campus. These days, a still small but growing number of public and private universities are looking towards instituting some form of electronically enhanced education programs.[9] This is not really distance learning, because students come to campus for part of the time, or engage in video and teleconferencing. Distance learning is also spreading. In addition to the University of South Africa, with more than 110,000 students, a number of other open universities have been established, for instance, in Zimbabwe, with a rapidly rising number of students. Several of the public universities of sub-Saharan Africa, such as Cheikh Anta Diop University of Dakar (UCAD) and the National University of Rwanda are also linked to the African Virtual University (AVU). Increasingly, therefore, there is what one can call a mixed mode of learning, with a combination of direct contact between teachers and students and some form of distance education, or rather, IT-assisted teaching and learning. The University of Pretoria, for instance, currently has 31,000 contact and resident students and 25,000 in a mixed delivery mode (University of Pretoria 2002).

The main obstacles to the further development of these mixed modes include the problem of access to IT. Out of the total population of Africa estimated at about 800 million at the beginning of 2002, only 1 million were IT users. Of these, 84% are in South Africa![10] Although the figures are changing very rapidly, we are still talking about a very small number of users in Africa, compared to other regions of the world. Moreover, even in South Africa, where the rates are much higher, the universities that want to make maximum use of

new technologies, such as the University of Cape Town and the University of Pretoria, are confronted with problems of bandwidth, expressing needs for satellites and other technologies to be able to transfer not only text but also images and sound. Currently, with a few hundred thousand IT users, who mainly transfer text, the situation is not so critical. However, when there are millions of users, there will be bottlenecks, especially for the transfer of images and sound. The problem is much more critical for the historically disadvantaged institutions of South Africa and for the vast majority of universities of the other countries of sub-Saharan Africa, where levels of connectivity are much lower than they are in South Africa.

As the institutional base has been changing, so has the demographic profile of the scholarly community. Looking at the institutions where scholars obtained their postgraduate training, where they lived and worked afterwards, and the issues they take up, Mkandawire (1995, 1997) argued that there have been three generations of African scholars. The first generation of scholars obtained postgraduate training outside Africa, but returned to the continent to form the nucleus of an African faculty for the new institutions of tertiary education of the 1960s and 1970s. The second generation also received its research training outside of Africa, mainly in the mid-1970s and 1980s; but unlike those of the first generation, many failed to return to Africa. One explanation was the onset of the crises of the mid- to late-1970s and 1980s. The third generation, that of the late 1980s and 1990s, involved much larger numbers of scholars than the previous generations, most of whom did their postgraduate training in Africa at a time when the universities were confronted with many more problems (Mkandawire 1995, 1997).

The typology gives a good sense of the generational changes. However, it needs to be refined to take into consideration the complexities of the trajectories of the scholars, to go beyond the issues of places where training was obtained, and whether or not they returned to Africa. It needs to examine how the concerns, perspectives, and ways scholars relate with the universities and the larger communities evolved with the scholars' generational changes. It is also important to relate generational changes in the community of scholars to the changing institutional generations to produce a better understanding of what is needed today.

The first generation was born and brought up under colonialism and joined the independence movements. Many of them shared nationalist aspirations and statist views of development. Many scholars of the present generation still go outside Africa for their postgraduate training. This comes out quite clearly in both the SIDA/SAREC-commissioned study on Makerere and the other three East and Southern African universities (Kwesiga et al. 2001: 8), and in the SSRC

report on the rate of return of African students who obtained postgraduate degrees in the U.S. (Pires, Kassimir & Brhane 1999). At Makerere, "over the last few decades, Ph.D.s in the social science field were obtained outside Uganda" (Kwesiga et al. 2001: 8). In Uganda, sending junior faculty to other universities in South Africa, Europe, North America, and other countries is one of the ways in which staff development is being carried out and institutional and individual social science research capacity built (Kwesiga et al. 2001: 16).

With the end of apartheid in South Africa, many Eastern and Southern African students and junior faculty now go to South Africa for their postgraduate training (Szanton & Manyika 2002; Kwesiga et al. 2001). The establishment of the USEPHIA and AERC networks, like the joint master's degree programs developed by the University of Pretoria with the University of Ghana (Legon), Makerere, and other universities, are some of these new ways of promoting partnerships and forms of cooperation in the development of postgraduate education in Africa. There is a need for more research on the challenge of establishing joint programs in postgraduate training and research at the regional and subregional levels. There are also a number of training and capacity-enhancement initiatives involving universities of the industrialized countries, African universities, and the networks, such as the one linking CODESRIA, Northwestern University, and the University of Ghana (Legon).[11]

Only a few people now do their doctoral studies at distressed universities such as the University of Sierra Leone. For instance, for the academic year 2001–2002, the Department of Political Science had only one new doctoral candidate who is also currently a junior lecturer at the university. The Department of Economics does not offer a Ph.D. program and had only three to four new admissions into its Master's of Science, Honours Program in the academic year 2001–2002. This means that most of the students who wish to enroll in master's and doctoral programs in political science or economics must go abroad. Several of those who do their undergraduate degrees in economics pursue a master's program currently being run by the African Economic Research Consortium in collaboration with several universities which have strong economics departments.

Ph.D.s obtained in Europe and North America, however, tend to be seen as more attractive to the university and to employers in government and in the private sector (Nyamnjoh, 2002). It is also important to find out whether there is a difference in levels and modes of participation in scholarly debates, publishing, etc. For instance, most of the respondents in a study entitled "The Flow of Information: Social and Economic Science in Sub-Saharan Africa" obtained their doctoral degrees from universities based outside of Africa (University of Groningen, 1997).

However, the late 1980s and 1990s can, broadly speaking, be called years of the third generation of scholars, most of whom have done or are doing their postgraduate training in Africa. Student populations have reached extremely high numbers, and the numbers of those who enroll in doctoral programs is also much higher than they were in the 1960s and 1970s (Szanton & Manyika, 2002; Sawyerr 2001), although the rates are still below what they are in the OECD countries. World Bank (2001: 7) figures show that the tertiary education enrollment gap between developing countries and the OECD countries has actually become wider.

> The tertiary enrollment rate in the US was 55% compared to an average of 5% for developing countries as a whole. In 1995, the numbers were 81% and 9% respectively. Equally worrisome is the low level of development of postgraduate education in many parts of the world. In the Latin American and Caribbean region, for example, students enrolled in postgraduate programs represent, on average only 2.4% of overall tertiary enrollment, compared to 12.6% in the United States.

The rates are generally even lower in many countries. This has important consequences in terms of differences in research capacities, for instance. The situation is made much more critical by the high rate of turnover in certain faculties, such as the faculty of economics at Edward Mondlane University in Mozambique (Uthuli et al., 2001: 6). Institutional capacity is therefore still quite weak in many universities.

The Small Grants for Thesis Writing Program sponsored by CODESRIA gives a good indication of the significance of the third generation. Between 1989 and 2001, the program has funded about 1,200 masters and doctoral theses, and the total number of applicants is five times higher. OSSREA, AERC, and other institutions have similar programs. In the last ten years, the CODESRIA Industrial (now Economic) Policies Network also awarded nearly 200 research grants to francophone economists, many of whom are in the early stages of their academic careers. The CODESRIA Economic Policies Network was established to support francophone economists in the early stages of their careers as lecturers in African universities. These economists, it was realized, were at a disadvantage in the sense that they had nothing in francophone Africa that was comparable to the AERC, which was providing support mainly to those who used English as their working language. The CODESRIA Small Grants for Thesis Writing are given to master's and doctoral students. Part of the grant goes toward purchasing recent, relevant literature. Research methodology workshops are organized periodically for cohorts of grantees in different

subregions. The Economic Policies Network supports research projects of junior faculty but also organizes workshops and training seminars for them.

Small grants programs such as these share a common desire to support a distressed generation based in higher education institutions that are themselves often in distress. More fundamentally, the programs contribute towards the reproduction of the research community by contributing to the training of younger generations of scholars. The ultimate solution, however, is of the strengthening of postgraduate programs of the African universities themselves. With additional resources, the regional networks and institutions could play much more significant roles in the regeneration of the universities, in strengthening the links between scholars of the region, and in strengthening communication between scholars from different regions.

We need to know more about this third generation in terms of its concerns, movements, membership networks, engagement in research issues and themes, and the paradigms it espouses. The implications of these changes in the demographic profile of the scholarly community for the universities and for social science teaching and research are quite serious. The implications will affect research priorities, training needs (capacity building), and policy. How are the universities responding to the changes? What happened to the first and second generations of scholars, and what are the intergenerational relationships? Is there significant intergenerational learning or transmission of knowledge? How does the combination of generation changes, dwindling resources, and paradigm shifts manifest itself in the social sciences?

These and many other questions come up regularly in discussions on graduate programs, grants, and fellowship schemes for postgraduate and postdoctoral scholars, and in methodology workshops and other research capacity building programs. In its report, the selection committee of the 1998 round of competition for CODESRIA's Small Grants for Thesis Writing observed that the range of topics was extremely broad, indicating both pluralism and dynamism in the social science research community. However, the primary concern of the applicants (418 in number) was with the "immediate and the empirical." Little attention was paid to literature and philosophy, "which are two disciplines that also give, and in pertinent ways, a key to the understanding and interpretation of the social world. Moreover, the richness of the research themes is in a total mismatch with the theoretical, methodological, and bibliographical poverty [of the dissertation projects presented]." The committee therefore urged CODESRIA to contribute to the dissemination of "theoretical and methodological innovations" (CODESRIA 1998: 4).

A meeting of representatives of the Rockefeller Foundation, representatives of African universities and research institutes, and selected conveners of

the North American African Development Dissertation Workshops, held in New York in May 1998, also made the following observation, which is quite similar to that made by the CODESRIA Small Grants selection committee:

> In many African countries a dynamic new generation of broadly development-oriented young and would-be scholars is emerging relatively free of the earlier generation's focus on national independence, and/or Cold war issues (the generational shift). . . . Many African universities are increasingly able to do basic academic training, but there are an important set of research capacity development activities, which call for additional inputs, and organizational initiatives which often fall beyond the gaze of the donor community (research capacity development). At the heart of the research capacity development is a series of needs which turn broadly on the question of research METHODS and on the creation of inter-generational learning and research communities around thematic concerns (methodological and thematic research capacity), (CODESRIA 1998: 1–2)

In sum, after more than 40 years of postcolonial development, both the institutions and the scholars have become much broader and have reached higher levels of indigenization. They are rooted much more deeply in local realities than was the case at the outset.

Changes in the higher education and the broader research landscape are part and parcel of the more general transformation of the African socio-economic and political environments. The "business" of social science is, precisely, to read, name, and try to make sense of social realities as they change. Research priorities and themes have therefore been changing. However, the realities are also changing in the relative importance attached to social research in general, to each of the social science disciplines, and, within disciplines, to each branch. This reclassification has been taking place partly on the basis of the perceived relevance to national development priorities whose very definition has been changing with the shifts in development paradigms and partly on the market value of the disciplines and the branches within them. The market value is seen mainly in terms of the marketability of courses, job opportunities available to graduates in these disciplines, chances of getting donor funding, and possibilities for engaging in commissioned research and consultancy.

Private Sector Challenges

The proliferation of institutions is a response to the challenges of the day, and it provides opportunities for many people who are aspiring to a good tertiary education. For the private sector, which includes the not-for-profit sector, the

holders of certificates obtained from these private institutions form a much larger pool of potentially operational graduates from which to recruit. This section begins with a brief review of the development of the private side of the higher education sector in Africa and then reviews some of the problems associated with that proliferation for both the state and the private sector.

Private universities were an unknown phenomenon in most African countries until recently. Now, they have begun to appear in a number of countries. As we have seen, even in Nigeria the number of private universities is still very small. Five universities were established by missions and by some well-to-do and very enterprising (although sometimes allegedly corrupt) individuals.

In Senegal, as late as the early 1990s, there were only a few professional schools, such as the Ecole Pigier, that were mainly local branches of schools in France offering courses and two-year degrees in office management, "bureautique" and "secretariat." With the reform of the tertiary education sector, there were eight tertiary-level institutions in 1996. The number has almost doubled since then. The new institutions include two private universities, the Université du Sahel, established by a collective of university professors, and the Université Bourguiba, which was set up by a group of enterprising individuals, including a mathematics professor at Cheikh Anta Diop University of Dakar and a one-time government minister. There are also local campuses of North American universities, such as Suffolk University, a private school of journalism, several schools of management and business administration, and a plethora of two-year tertiary-level professional schools offering courses in informatics, nursing and other health-related professions, hotel work, tourism, communications and marketing, accountancy and commerce, insurance, etc.

A similar development occurred in Nigeria and in a number of other countries. Zimbabwe has eight universities and several other regional (such as SARIPS) and national institutions (Nhema 2000). Kenya and Tanzania each have numerous tertiary education institutions. Even in conflict-ridden Sierra Leone, the government plans to open two new universities (in addition to the already existing University of Sierra Leone, located in Freetown), and three polytechnics in the next two or three years.

In the case of Senegal, the proliferation followed the liberalization of the higher education sector in the early 1990s. Before the reforms, admission to the university was guaranteed to all Senegalese secondary school graduates. It no longer is. With the rise in the numbers of unemployed degree holders, the locally obtained university degree was thought to be of a lesser value. Instead, professional certificates and degrees that are said to be more practice-oriented were preferred. Here, as in Nigeria and elsewhere, the U.S.-type MBA has

become the most prestigious degree, one that almost guarantees its holder employment at a good salary. The Senegalese state also created a new, public university in the city of Saint-Louis in the northern part of the country. This university was designed to ease the pressure on Cheikh Anta Diop University of Dakar (UCAD), where the student population had reached unmanageable levels compared to the facilities available, and to find a way of addressing the high levels of politicization of the student body and faculty. Gaston Berger University (UGB) of Saint-Louis, as it is called, was therefore to be a fairly elitist development university. Success has so far been quite limited. The public universities have opened private centers for evening classes where fee-paying students, workers, and ordinary students needing extra classes (for instance, students expelled from the main university following a change in the rules on the number of repeats allowed) can acquire some rapid training ("formation accélérée") and enroll for degree courses. This is one way of raising funds for the university and earning additional income for the faculty teaching in these centers and special programs.

In Nigeria, almost all the major universities opened satellite campuses in Lagos and in the other "viable" cities, as they call them. The lead in this approach was taken by the University of Lagos (UNILAG), which had a very business-minded vice chancellor. These satellite campuses offer degrees and certificate-granting programs at a relatively high price. This situation created so many problems that the Nigerian federal government recently decided to close all satellite campuses, after earlier attempts to restrict them to a radius of 200 kilometers from the main university failed.

In addition to the proliferation of private centers and institutions—some of which are creations of public universities—there are also a number of open universities, distance learning institutions, virtual universities, corporate universities, etc. While there are many benefits associated with an expanding and more vibrant private higher education sector, they are also accompanied by several problems.

The first problem is that the costs are often quite high, beyond what many would-be students can afford. In Nigeria, depending on the university offering the degree, a student who enrolls in an MBA program would pay at least 100,000 Nairas for the year. In U.S. dollars, this price is not much compared to what it would cost in the United States, but it is still too high for most Nigerian students.[12] Those enrolling for such courses are therefore from middle-class families or people who are already employed in banks, insurance companies, etc. Access to quality higher education for the large mass of students leaving high school every year is, therefore, still an issue.

Cost is not, however, the only issue. While authorities of the University of Sierra Leone were unable to raise student fees because of both government and student opposition to the idea, they have succeeded in getting the large numbers of secondary school students who fail their final exams to enroll in an access program especially designed for them, to improve their chance of obtaining admission to the university. The fees for participation in the access program are currently higher than the fees paid at the university. Another important problem is the poor quality of the training given in some of the new tertiary education institutions. There is a need for some regulation and closer monitoring of the curriculum and quality of the education given in these institutions (Nyamnjoh 2002). In Senegal, institutions are granted permission to operate and are recognized as degree-granting institutions by the Ministry of Higher Education after having functioned for two sessions. MBAs offered by satellite campuses of Nigerian universities could be obtained within one year, which is not possible in universities such as the University of Nigeria, Nsukka, where it would take two to three years.

Related to the quality problems are those that of accreditation. Accreditation is one way to ensure minimum standards from new courses and new degree programs. Left to themselves, some of the new institutions might not be very rigorous about the standards and quality of the education they provide. Degree granting ought to be properly regulated. On the other hand, the rapid development of the Internet and the transformation of delivery modes and publishing outlets has, in some cases, taken academic and state authorities by surprise. This situation is even more critical when it comes to electronic journals. None of the electronic journals is yet accredited in South Africa.[13] Similarly, there is a need for overall regulation of degree-granting institutions and peer review or other quality-control mechanisms for journals. Some of these things may be easier done at the global level, which is what led Mamphela Ramphele (2001) to point out the need for global credit standards.

Few of these new institutions have good Ph.D. programs and few engage in research. Yet without research, most universities run the risk of turning into "glorified secondary schools" (Mukuma 2001: 15). As Mamdani said:

> Universities cannot function as government departments, just as they cannot function as businesses. It is the very fact that universities are not limited by short term considerations—as governments and businesses are, one to capture votes and the other to make profits—this unique freedom gives universities the capacity for a longer term orientation research. Any higher education [institution] worth the name has to involve [itself] in research. For society, research is an investment in the future. The single most important distinction between universities and

> secondary schools, even technical colleges, is that only universities carry out research. The reward for research, and the measure of its ability, is not narrowly monetary. The real significance of research for society is that it expands our options and thereby secures us an independent future. This is why nowhere in the world is higher education a profitable enterprise, why nowhere is higher education possible without heavy social subsidy. (Quoted in Mukuma 2001: 15)

The new private institutions are therefore far from being in a position to replace the traditional universities as knowledge-producing institutions. Instead, the new institutions not only depend on traditional institutions for their teaching staff and for the development course content, but they also take time and human and intellectual resources away from the traditional institutions. In almost all of the recent studies on research in Africa (Aina 1998; Allen 1986; Kwesiga et al. 2001; Mushi et al. 2001), consultancy and various forms of private practice have been identified as major hindrances to research, teaching, and publishing in the universities.

The issue of graduate unemployment is also far from being resolved by the proliferation of private institutions awarding professional certificates. The problem is not always with the kind of disciplinary background or training acquired. When civil engineers, medical doctors, and accountants can remain unemployed for extended periods of time despite prevailing underdevelopment, poverty, and health problems, the issue is certainly not simply one of training. It may well be that the problem is partly in the ways that African developing economies are organized and with the absorptive capacity of the economy. The major challenge to the private sector is to increase the possibilities for employment and to enter into creative partnerships with the state and the civil sector in various areas of public interest.

Finally, as the situation in several countries shows, private sector-led tertiary education institutions are mainly money-making ventures. The private sector does not have to duplicate the efforts being made in the traditional institutions. Instead, it could support the traditional institutions in various ways and benefit both directly and indirectly from the services that the traditional institutions provide.

Conclusion

The traditional higher education institutions are still the main providers of higher education in Africa. Moreover, even in a relatively well-resourced country like South Africa, two thirds of all university resources come from the state. Even at of Makerere University in Uganda, which is often presented as a good ex-

ample of an institution that has successfully converted itself to good, business-like management practices, 60% of the funding still comes from the state. Private higher education institutions are gradually increasing in numbers. But in the most important centers of higher learning—Nigeria, South Africa, and Egypt— the three countries which together host more than half of the higher education institutions in Africa and account for most of the scientific production carried out on the continent, there are extremely few private universities. There is, therefore, still a great deal of public interest in higher education, and public support for higher education is still a necessity. Without it, a number of fundamental aspects of higher education will run the risk of withering away. One consequence of such a development would be the serious threat that it would pose to the existence of a strong, indigenous intelligentsia in Africa, one that can really think through the future of the continent.

Many of the new tertiary education institutions, especially the private ones, depend on the traditional institutions for teachers, teaching materials, and a number of other things. In this paper I have argued that, as a matter of fact, without the traditional higher education institutions, specifically the public university, many of the private institutions that exist in Africa today would not survive. For this reason, I think it would be unrealistic and actually quite risky to leave higher education entirely to the private sector. Instead, because of the social value of the university degree and the high demand for higher education, it is likely that more complementary relationships will develop between the private sector and the public universities.

But the links that exist between the institutions of the traditional model and those of the alternative models are many, and the flows are not entirely unidirectional—from the traditional to the new institutions. The new institutions have actually obliged the traditional ones to adapt and rationalize their methods and ways. Teachers remain in the public universities partly because they have possibilities for supplementing their incomes and because they can be confronted with intellectual challenges outside of the traditional academy through their involvement in regional networks and projects initiated by independent institutions.

We need, however, to recognize the limitations inherent in current private-sector initiatives in the higher education sector in Africa. These initiatives are often ad hoc, sporadic, and geared towards short-term gains with little regard for issues such as basic research, the long-term reproduction of the scholarly community, and academic freedom. The main challenges for higher education development in Africa are closely linked with the global and continental economic and social processes. Responses must therefore be seen in that context.

And both the traditional institutions and scholars have been very creative in responding to the challenges facing African higher education. The private sector has the potential of playing a significant complementary role to that of the state sector, but an appropriate regulatory framework is needed. There is now a consensus on the need for rational, democratic, and accountable management of higher education institutions, both public and private, both of which are working out ways of taking advantage of the opportunities offered by the IT revolution. If the South African experience is anything to go by, public institutions are not necessarily a handicap. The University of Pretoria is one of the few universities anywhere with a Department of Telematic Learning and Educational Innovation, established in 1997, and comparable to what in industry would be an R&D unit. The University of Cape Town has also been at the cutting edge in the use of new information and communications technologies, as well as in the development of academic programs of teaching and research. Of course, South Africa's historically disadvantaged (i.e., Black) higher education institutions are far from reaching such high levels of technological development; but here too, as in other parts of Africa, it cannot be said that the main problem is in their being traditional institutions. If anything, many innovations have taken place in traditional higher education institutions in the last 20 years or so (Ford Foundation 2001).

In many sub-Saharan Africa countries, therefore, higher education systems are made up of both traditional institutions using mixed modes of delivery and learning and new kinds of institutions and modes of delivery. Furthermore, both the traditional institutions and modes are actually in a constant state of "reinvention." The higher education and knowledge systems are, however, both still dominated by more traditional institutions and modes.

Finally, although both the traditional and the new institutions are challenged by the internationalization of higher education, it is in the public university that basic research is being taken more seriously. And it is here that concerns about issues of equity (including gender equity), social accountability, social relevance, and academic freedom are taken up with a significant degree of seriousness. It is also mainly in the public universities that one finds good Ph.D. programs. (Ph.D. programs exist in 82 of the 175 universities listed in the AAU survey of universities of sub-Saharan Africa.) A recent study on Ph.D. programs in the universities of sub-Saharan Africa (outside of South Africa) commissioned by the Rockefeller Foundation identified "a strong consensus . . . as to which universities had historically been strong in the social sciences, arts and humanities. All nine universities which currently seemed the most promising in these fields" are also all public universities (Szanton & Manyika 2002: 5).[14]

There is, therefore, an extremely solid case for public and donor funding of higher education and research in Africa, precisely when the whole world now seems to recognize the fact that higher education is a vital factor for economic and social development under the conditions of globalization. The Internet has created unprecedented opportunities for the rapid diffusion of scientific knowledge, but it still matters where this knowledge is produced.

Notes

1 The author expresses appreciation to Nancy Ruther for her editorial comments, and to Yaw Nyarko, David Collis, Robert Evenson, Awa Ba, and Sarah Manyika for their comments on earlier drafts of this paper.

2 The *Concise Oxford English Dictionary* (ninth edition, 1995) defines higher education as "education at university etc. especially to degree level" and it defines tertiary education as "education in a college or university, that follows secondary education." In this paper, I therefore use the concepts interchangeably.

3 These include a CODESRIA (Council for the Development of Social Sciences in Africa) workshop on challenges facing African universities at the beginning of the 21st century and implications for CODESRIA (Dakar, Senegal, December 2000); a workshop on Knowledge Networks and the Universities in Africa; and a planning meeting to launch a research project on social science and higher education research in Africa, both of which were co-organized by the SSRC and the AAU (Accra, Ghana, February 2000 and June 2001); and an AAU planning meeting held in Accra in December 2001 about a SIDA/SAREC (Swedish International Development Cooperation Agency) inventory of the social sciences in Mozambique, Tanzania, Uganda, and Zimbabwe jointly carried out in 2000 by nationally mixed teams of scholars from the leading universities of these countries.

4 I use "postcolonial" here in a purely chronological sense, referring to the period following the end of colonialism.

5 Together with its polytechnics, Nigeria has about 60 higher education institutions (Amuwo, 2001).

6 Szanton & Manyika (2002). In the first quarter of 2002 following the publication of a government-commissioned report on higher education, there was a very heated debate in South Africa on the need for, and means of persuading, some of the universities and technikons to merge into more coherent and complementary bodies.

7 The Naira was then very strong—actually overvalued—and one Naira was exchanged for approximately two U.S. dollars. At this writing (October 2001), the rate is 120 Nairas to US$1.00.

8 On the concept of the "public good" and its importance in the discussion on higher education transformation, the first issue of *Kagisano* (published by the Council on Higher Education, South Africa) in which the Singh and Jonathan articles appeared contains other relevant material: Higher Education Discussion Series, No. 1 (Sum-

mer 2001): "Re-inserting `the Public Good' into Higher Education Transformation."

9 These points were made by several professors teaching at the University of Pretoria, South Africa, to a U.N. University for Peace Consultative Mission to South Africa in early April 2002 in which I participated.

10 These figures were given to the UPEACE Consultative Mission to South Africa by Dr Hussain Solomon, Senior Researcher at the Africa Institute of South Africa and Associate Professor at the University of Pretoria, Pretoria, April 2002. There is no agreement as to how to define Internet users and access to the Internet. Should "users" include people who use only e-mail? Should it include people who send messages through others? Some define users only as people having accounts with service providers that do not include such online groups as Yahoo, Hotmail, Caramail, and many others. Yet with the spread of cybercenters (often called "cybercafés," although they rarely have resemblance to a café), many users open accounts with these online providers and are omitted from surveys and censuses of Internet users. The actual numbers of users in Africa might therefore be much higher than the figures indicate. I am grateful to Jessica Davies of Georgetown University for drawing my attention to this fact.

11 I was also involved in exploring possibilities for launching a joint initiative between Yale University's agrarian studies program and CODESRIA to promote agrarian studies in Africa, possibly with SARIPS in Zimbabwe, with whose director discussions were begun. Although the initiative is still to be launched, in 2002 the former director of SARIPS decided to move on the idea and established an African Agrarian Institute in Harare with a view to finding ways of bringing on board partners such as Yale and CODESRIA, as was originally planned. The idea of triangular partnerships involving institutions of the industrialized countries, a regional organization, and African universities may therefore be something to explore further.

12 This relatively low cost of the MBA—by international standards—was probably what prompted one of the UNILAG VCs to try and open a satellite campus in South Korea as well!

13 This information comes from Hussain Solomon, Senior Researcher at the Africa Institute of South Africa and Associate Professor at the University of Pretoria, April 2002.

14 The nine universities of SSA, outside of South Africa, are: Cheikh Anta Diop in Dakar; the University of Ghana, Legon; Yaounde II in Cameroon; the University of Ibadan; and the University of Lagos in Nigeria; Makerere University in Uganda; the University of Dar es Salaam in Tanzania; Eduardo Mondlane University in Mozambique; and the University of Zimbabwe.

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African Universities and the Challenge of Research Capacity Development[1]

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Abstract

Critical for Africa's future is strengthening indigenous educational systems and institutions for generating and applying knowledge by assuring long-term *public* support with emphasis on research capacity. In addition to individual skills developed in research work, research capacity includes: quality of the research environment, funding, adequate infrastructure, research incentives, time available to the researcher, etc. In most African countries, conditions for research have been severely compromised as manifest by the generally poor remuneration, heavy teaching loads, inability to mentor young faculty, and inadequate infrastructure. While the adequacy of public funding is a crucial condition, there are a number of concrete programmatic initiatives that could be taken by the higher education and research institutions themselves. These include strengthening of graduate study, improvements in the management of research, provision of a "soft landing " for young faculty, identification and concentration on "areas of strength, " and pooling resources with other institutions. Special initiatives aimed at individual research capacity development include the *Study Programme for Higher Education Management* of the Association of African Universities (AAU); the Working Groups and Institutes of the Council for the Development of Social research in Africa (CODESRIA); and the work of the National Mathematics Centre of Nigeria.

Résumé

Pour son propre avenir, l'Afrique a besoin de renforcer son système d'éducation et ses institutions indigènes, pour la génération et l'application du savoir, en assurant un support *public* à long-terme, avec une attention toute particulière accordée à la capacité de recherche. Outre le savoir-faire personnel développé

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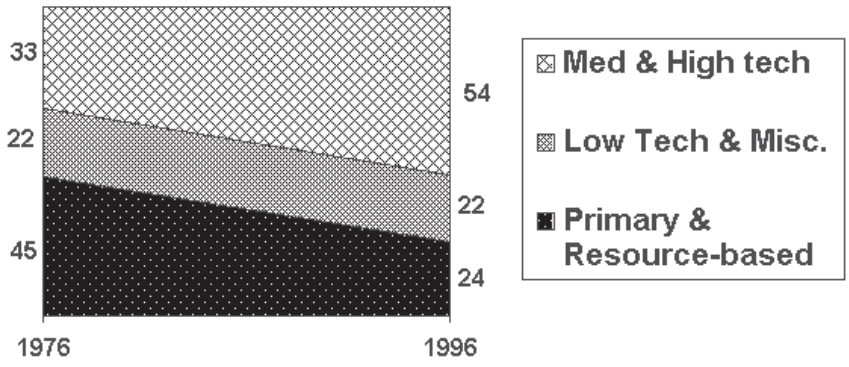
dans le cadre du travail de recherche, la capacité de recherche englobe : la qualité de l'environnement de recherche, le financement, les infrastructures adéquates, les formes d'incitations à la recherche, le temps disponible pour le chercheur etc. Dans la plupart des pays africains, les conditions de recherche sont remises en cause, comme le prouvent les faibles niveaux de rémunération, les lourdes charges d'enseignement, l'incapacité à encadrer les jeunes facultés, et les infrastructures inappropriées. Même si le financement public demeure une condition primordiale, il y a un certain nombre d'initiatives programmatiques concrètes qui pourraient être adoptées par l'éducation supérieure et les institutions de recherche elles-mêmes. Celles-ci englobent un renforcement des études de second/troisième cycle, une amélioration de la gestion de la recherché, l'assurance d'un _atterissage en douceur " pour la jeune faculté, l'identification et le ciblage de " zones fortes " et enfin, le partage de ressources avec d'autres institutions. Parmi les initiatives spéciales visant à développer la capacité individuelle de recherche, figurent : *le Programme d'études pour la gestion de l'éducation supérieur (Study Programme for Higher Education Management),* de l'Association des Universités Africaines (AAU), les groupes de travail et instituts du Conseil pour le Développement de la Recherche en Sciences Sociales en Afrique (CODESRIA), ainsi que les travaux du *National Mathematics Centre* du Nigeria.

Introduction

The rise and spread of the "knowledge society " in the developed countries has led to the hegemony of modern knowledge and its manifestations and has opened up virtually all societies to increased pressure from global values, products, and services. This development has implications, both positive and negative, for all societies. On the positive side, the spread of modern knowledge offers possibilities for improvements in the quality of life worldwide, through the better understanding of modern hygiene, nutrition, environmental protection, governance systems, and so forth. It also provides the initial conditions for productivity increases in virtually all production and social sectors. On the negative side, one could mention the tendency to political and economic domination by developed economies and their institutions; the increasing homogenization of cultures and threat to local knowledge, resulting from the unrestrained importation and imposition of foreign goods, services, and cultural forms; and the exacerbation of local differences and inequalities through uneven access to such knowledge and the means for its application.

Today, production, management, and service delivery in all sectors require basic as well as advanced technical and managerial competencies, without which a society will tend to underperform in global competition. The evidence is that goods and services to which value has been added by modern technology dominate world commerce, with the result that export-led economic growth favors those with access to value-adding technology. Figure 1 provides a graphic illustration of this point.

Figure 1: Technological intensity of goods in international trade, in percentages.



In all this, access to modern knowledge and its application feature decisively. Every society must have the capacity to generate, acquire, adapt, and apply modern knowledge if it is to take advantage of the opportunities and reduce the risks posed by the rise of the knowledge society.[2] While foreign expertise could be deployed for many purposes, certain foundational functions—including the identification of needs, the making of basic policy choices, and, indeed, the very selection of foreign expertise—are best performed by local cadres. Here it is important to distinguish access to information from the acquisition of knowledge, which is a more deliberate, more purposive activity. Information is transformed into knowledge when it comes to be "owned, " through absorption, synthesis with prior knowledge and experience, and location in context. Thus, knowledge can only be acquired through doing for one's self.

With the increase in the knowledge intensity of social and economic life worldwide, the majority of societies face a real threat from the unequal access to current information and modern knowledge. This situation exacerbates the phenomenon of unequal development and exchange in international trade, widening the development gaps between the information-rich and information-poor among and within countries and regions. At the same time, it reinforces the political and cultural dominance of the North. Countering these tendencies calls for a range of political, cultural, and economic measures at the national and global levels, which cannot be fully explored here. What can be said is that every society needs to insure the existence of viable indigenous knowledge systems, i.e., local institutions, structures, and cadres which, in combination, are able to access knowledge from all sources—external and home-grown, traditional and modern—synthesize it, adapt it, and generally make it usable by local communities and agencies under local conditions. The inadequacy of such systems in Africa is both cause and effect of the continent's knowledge-poverty and deepening material deprivation.

The situation is different elsewhere. In industrialized countries, advanced learning and research are receiving increased attention and investment in recognition of their acknowledged contribution to economic development and global competitiveness. The resulting "surplus capacity " in the higher education sector in the Organization of Economic Cooperation and Development (OECD) countries is increasingly absorbing global excess demand for higher education in the form of (a) students and researchers from developing countries who go to OECD countries for study and research and (b) the marketing of higher education by institutions in developed countries to developing countries, from outside or on-site. Not surprisingly, higher education is increasingly recognised in OECD circles as an "export industry with a positive balance of trade " (Mallea et al. 2001).

It is instructive that those same OECD countries that, as donors, exercise so much influence on the development of Africa's higher education systems downgraded their support in the 1980s and 1990s, pressing African governments to favor basic education at the expense of higher education. The argument, most forcefully articulated in a number of World Bank documents, is that, given generally low coverage in Africa, basic education yields a better return on investment than higher education and is, in any event, more equitable. There is much to question about the technical basis of this argument and its soundness in the contemporary situation of Africa (Carnoy 2000: 15–17, Schultz 2001; Task Force 2000: 39). But the concern here is with the effect of its adoption, namely, the severe underfunding of the already run-down African universities and research institutions, despite the acknowledged preeminence of high-level

knowledge as a factor of growth and development in modern society and at a time of exploding demand for higher education in Africa. It does not take much to divine the source and causes of the "excess global demand " for higher education that is to balance the "surplus capacity " in the OECD countries!

Does this situation, created through deliberate policy and specific measures which entrench initial differences, look like a case of "manufactured comparative advantage " to be used to explain and justify supposedly market-determined differential development of the various parts of the world? By thus deepening the international imbalances in the provision of higher education, are these contradictory policies not consolidating the existing system of unequal global development?

What remains clear through all this is the crucial role that Africa's systems and institutions for knowledge generation, synthesis, adaptation, and application have to play in insuring the advancement of the national interest on all fronts, economic, social, cultural, and political. Central to these knowledge systems are the universities and their research and advanced training programs. To a greater degree than elsewhere, Africa's universities continue to provide the vast bulk of its research and train virtually all its researchers. To be sure, alternate sites for the generation and adaptation of knowledge are emerging and assuming prominence: public research institutes, private research centers, firm-based research units, regional and subregional centers, nongovernmental organizations, and so forth. But the trend is only beginning and has yet to pose any kind of threat to the dominance of the university as the core of the knowledge generation, reproduction, and dissemination systems in Africa. Thus, the strength of Africa's universities and research institutions is a key condition for its development, and their weakness is an index of, as well as a contributor to, its poverty.

Recognition of these simple truths, the fashioning of appropriate policies, and the mobilization of the relevant constituencies and resources in their support are strategic imperatives that call for national political and policy leadership of the highest order. Sad to say, African countries have ceded this strategic ground under pressure from the international financial institutions and the donor community, as well as from their weak economic situation. Over the past two decades, they have tended to underfund and run down their universities and research institutions, purportedly in favor of strengthening basic education. The situation at Makerere University in the 1970s and 1980s illustrates the situation. (See Appendix.) While there were varying degrees of deterioration from country to country and institution to institution, and while several

universities, including Makerere itself, have started on the road to recovery, the general pattern of the period has been the same.

This brief account of the degradation of indigenous knowledge production capabilities in Africa at a time of heightened global appreciation of the significance of knowledge generation and application provides a backdrop to the consideration of the circumstances of African research and research capacity development.[3] It is not my intention to cover fully the current state of African higher education nor the status and future of research in Africa. More modestly, I will paint a broad-brush picture of the context of research capacity development, distinguishing two main components of research capacity, namely the environmental and the human, as explained below, and their current status across Africa. This discussion will serve as background to the consideration of the challenges that need to be addressed in developing long-term knowledge generation and application capacities. I shall conclude with a description of some programs that are helping to meet these challenges.

Research Capacity in Africa

My vision for African research is the sustained indigenous generation of world-class research results and new knowledge that help our understanding of African conditions and contribute to the advancement of its people.[4] This definition envisages research by African researchers working primarily at African institutions, turning out first-rate knowledge on locally relevant issues. The insistence on African research and researchers at African institutions is to insure rootedness and the sustainability of knowledge generation, as well as the increased likelihood of relevance and applicability. This condition presupposes local institutions and an environment adequate to support research of the highest calibre and insists upon the rootedness of such research as well as its positive spill-over effects on the local society.

Though successful research is frequently attributed to individual researchers or research teams, we all know that such success is determined by more than individual brilliance, hard work, and team competencies. It turns also on such factors as the nature and quality of the research environment generally, the facilities and other means at the disposal of the researchers, and prior or contemporaneous work by other researchers in related fields. In talking about research capacity, therefore, it is useful to consider two key components. In addition to a human (individual or team) component, which may be called the "active " component, there is also an "environmental " component, constituted by the social, institutional, and material factors that provide a setting for the research enterprise and condition its success or failure. This environmental

component may be viewed through two key sets of conditions, the general or broad societal conditions on the one hand, and, on the other, the institutional, namely, organizational, managerial, and material conditions within a particular institution.

Research Capacity: The Active Component

In universities and research institutions, the capacity of individual researchers, including their skills, competencies, attitudes, and values, is developed primarily through appropriate training programs and courses and involvement in research activity. It is nurtured by the assembling of a critical mass of researchers, the cultivation of a positive research culture, and the presence of incentive systems that make a research career attractive.

The traditional, and still dominant, research model is that of an individual or a small group of persons pursuing research on a topic of their choice and in their area of professional interest. The typical project is still discipline oriented, university based, and funded by the university or under its auspices. It makes free use of university facilities and time and is undertaken essentially as part of the academic career of the researcher who decides what to study and whether and how to disseminate the results. Support for this reading of the situation is provided by a study of research management in nine African universities, undertaken by the Association of African Universities (AAU) in 1996. As displayed in Table 1, the proportion of individual (as against team and multidisciplinary) research projects conducted over 1989–1994, ranged from almost 95% at one end of the scale to 50% at the other (Shabani 1996, Table 2).

A variant on this theme has emerged strongly in recent years. With the reduction in institutional funding for research, there has been increasing recourse to commissioned projects procured directly from a donor or other sponsor without university involvement. Particularly in the social sciences, this pattern has reportedly led to increasing individualization and, from the perspective of the university, informalization of research. Owing to its funding outside the institutional system, this kind of research provides scant support to the building of institutional capacity, given the likely external determination of topics and its generally applied character, nor is it likely to make much of a contribution to systematic theory building.

This continuing importance of individual research gives graduate and postdoctoral training particular significance, as a key source of generational continuity and maintenance of the "human capital stock " for research. I will address this subject in greater depth below.

Table 1: Categories of research projects: Individual research conducted from 1989 to 1994

University	Basic Sciences			Applied Sciences			Humanities				% of total
	MA/MS	Ph.D.	Others	MA/MS	Ph.D.	Others	MA/MS	Ph.D.	Others	Others	number of projects
1. Antananarivo (Madagascar)	na	na	na	na	na	na	na	na	na	na	na
	na	na	na	na	na	na	na	na	na	na	na
2. Enugu State University of Science and Technology (Nigeria)	na	na	na	na	na	na	na	na	na	na	na
3. Zimbabwe	30	12	122	68	38	303	26	14	66	669	60
4. Malawi	na	na	na	na	na	na	na	na	na	na	na
5. Yaoundé 1 (Cameroon)	21	33	41	12	2	26	36	12	9	192	na
6. Ouagadougou (Burkina Faso)	0	2	42	0	12	155	0	7	191	409	77.7
7. Université Nationale de la Côte D'Ivoire	na	na	na	na	na	na	na	na	na	na	na
8. Ghana—Legon	na	na	na	na	na	na	na	na	na	na	na
9. Uyo (Nigeria)	0	0	2	0	0	3	0	0	19	24	83
10. Suez Canal University (Egypt)	79	82	0	478	174	0	180	81	0	1074	94.5
11. International Center Insect Physiology and Ecology (Kenya)	0	20	0	0	20	0	0	0	0	40	50

Source: Juma Shabani, *Research Management in African Universities* (1996), Table 2.

Research Capacity: The Environment Dimension

General Conditions

The first set of general factors that facilitate or hinder research, independent of the skills or values of individual researchers, relate to the macro-environment of public policy and resource allocation. In the first place, research interest and individual capacity are rooted in the quality of education in the society generally. An educational system that encourages and equips people to be curious about nature and society and to develop an interest in the pursuit of knowledge and ideas is an indispensable general condition for the development and sustenance of a research culture. Also important are broad social policies and practices that encourage and facilitate the flow of information and reward innovation and inquiry. An atmosphere of political or cultural intolerance has a chilling effect on research, and, therefore, on the nurturing of research capacity. Further, social recognition of achievement and the ready utilization of good ideas provide nonmaterial but powerful incentives to research excellence and innovation.

A more immediately relevant condition is the availability and adequacy of the means for undertaking research. The underfunding of research and research institutions in Africa has already been mentioned. Since much vital research yields little direct and obvious benefit, the strategic importance of long-term public support for the sustenance of a research culture and capacities is generally recognized. In the industrialized and newly industrializing countries, such public support is supplemented by private investment, especially in applied research. In Africa, on the other hand, straitened economic circumstances combined with the recent policy bias against public financing of higher education, have contributed to the underresourcing of research. (See Table 1.) This policy constitutes a major strategic misstep. But the problem is more fundamental yet. To appreciate this, account must be taken of the character of most African economies and the specific forms of their insertion into the global economy. As the typical African economy has become more outward looking, its leading edges have locked more firmly into external knowledge sources: local producers relying on foreign-based parent companies for research, the use of finished inputs in local manufacturing and agriculture, the wholesale importation of finished consumer goods, and the dependence of government and public institutions on foreign expertise and experts in preference to local sources. Under such conditions, local knowledge generation becomes increasingly uneconomic, and market forces direct resources away from support for the local production of modern knowledge.

If it is accepted that the local production and reproduction of knowledge are crucial to the effective and sustainable development and management of society, then the absence of incentives for private investment in research and research capacity development in most African countries represents an instance of market failure. Generally, explicit public policy would correct for such market failure. As earlier noted, that is the situation in the OECD countries, where official policy reinforces the market in insuring that higher education and research receive adequate investment from both private and public sources. But this is not what is happening in Africa, at least not with the frequency and on the scale required to make a difference. Not surprisingly, underinvestment leads to generally anemic local research performance and capacity development. I will return to this topic later.

Institutional Conditions

The second category of environmental conditions for successful research focuses on the institutional context within which research is conducted. The key elements here are a minimum of research infrastructure, such as laboratories, equipment, libraries, and an effective system of information storage, retrieval, and utilization; appropriate management systems; and policies that facilitate and support the research enterprise including incentives that recognize and reward high-calibre research. The need for facilities, good management, and appropriate incentives is obvious, and calls for little emphasis here. What is not so well appreciated is the effect of nonmaterial conditions such as vibrant graduate study programs, effective research management systems, and an institutional culture supportive of research and inquiry. I will comment briefly about the first two of these conditions.

The extreme weakness of graduate study programs in most African universities is among the most serious of the institutional limitations on research capacity development. While the paucity of relevant data makes it difficult to be firm on numbers, the AAU study mentioned above found that, in the early 1990s, excluding the one fully graduate institution in the sample, the proportion of graduate students out of total enrollment at the responding institutions was between 7% and 1% (at a francophone university with enrollment in excess of 40,000 at the time) (Shabani 1996: 23). A more recent study suggests some improvement in the situation. While it is difficult to establish the number of Ph.D. graduates turned out by sub-Saharan African universities (excluding South Africa), that number is increasing. This is said to be the result of reduced opportunities for Africans to do doctoral work in the usual western institutions, combined with increased pressure, especially on academics, to obtain such qualifications for career purposes. But the report notes that the increase

in locally trained Ph.D.s is from an unacceptably low base; while it is likely to continue, it will do so at a slow pace unless drastic corrective measures are taken (Szanton & Manyika 2001). The implication is that, without such corrective measures, the "stock " or foundation members will remain far below the demand for such capacity.

This sad state of graduate study reflects some of the environmental weaknesses previously identified, if only to the extent that graduate study programs and research are underfunded. The graduate stipend is not enough to support full-time study, and the job market, by and large, does not adequately reward advanced study. Apart from the resulting failure to insure the reproduction of the faculty, the absence of adequate numbers of graduate students at any one time in any institution means, not only the absence of the natural foot soldiers of any research undertaking, but also a severe shortage of the potential teaching assistants needed to help release more of the time of senior faculty for research.

Research Management

The increased recourse to outside funding sources that, by and large, favor larger-scale, more applied projects, has consequences for the nature and scale of research projects and the relationships of researchers with both funders and the university or other home institution. As the focus shifts away from individual choice and as the scale of operation increases, funders tend to move away from informal arrangements with individual researchers and seek the assurance of institutional oversight for funded projects. With the resulting increase in the role of institutions in the procurement, management, monitoring, and certification of projects, the success of research comes to turn increasingly on the effectiveness with which those institutional functions are discharged. This case is particularly true for contract research where, drawing on economies of scale and specialization, it is possible for an institution to develop and provide essential project support, management skills, and services that the individual researcher, or even project team, could not be expected to deploy on his/her/their own. In this sense, the availability of effective research management and support facilities, skills, and systems within an institution have become an important aspect of the research procurement and delivery capability of the institution and its members.

But there is a downside to this trend toward increasing institutionalization of research. As we all know too well, undue bureaucratization and poor institutional responsiveness can be a major drag on research performance. Unsatisfactory recordkeeping, ineffective structures and systems of coordination, unclear specification of the research obligations of academic staff—as well as the

indifferent quality of research support staff reflecting the low priority attached to training and specialization in research management and administration—create negative conditions for conducting research and building research competencies.

The combination of material provision, policies, management systems, and institutional culture described above, speaks to the institutional capability for research support. This capability, together with the more general factors mentioned earlier, constitute the environmental dimension which conditions whether and how far moderate talent is able to develop and realize its potential to do useful research, and whether first-rate talent has the opportunity truly to excel. One of the tragedies of African research is the frequency with which limitations in the research environment frustrate such talent. The brain drain out of Africa owes as much to this factor as to any others.

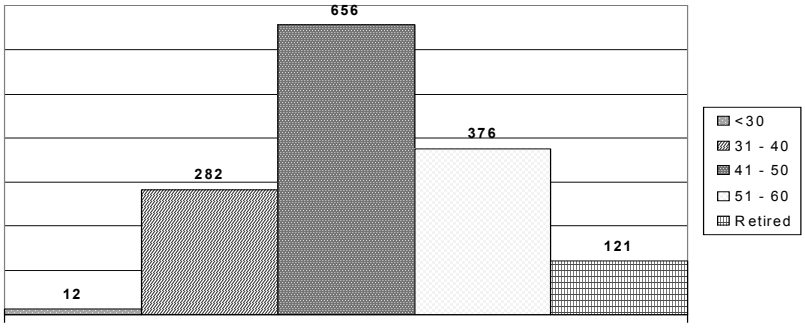
The distinction drawn here between the active and the environmental components of research capacity is not intended to obscure the fact that they interact continuously. The human factor contributes critically to the creation or negation of the requisite environmental conditions, while the environmental conditions enhance or inhibit the development of individual capacity.

Bottlenecks and Problems: The Challenge

Allow me to now set out a series of general propositions that, I believe, should be taken into account in any consideration of research and research capacity development in Africa. Apart from formal training in the conduct of research at institutions of higher learning and research, particularly at the graduate level, individual research capacity develops principally "on the job. " It develops in the course of conducting research, whether this be an individual or team effort and whether it be in an academic or research institution, in industry, government, or in a nongovernmental institution. It is in this process that the skills and insights acquired as part of formal training are sharpened and extended, when research skills and research product are brought into direct relationship. Moreover, ongoing research, particularly when it is collective or networked, provides an irreplaceable opportunity for the experience of each member of a team or network to complement and help raise the capacity of others. For young and mid-career researchers such participation, especially under the mentorship of senior colleagues, constitutes the most effective form of research capacity development. Thus, in the absence of on-going research activity, one cannot talk meaningfully about research capacity building. From this perspective, the most serious bottlenecks to research capacity building in Africa may well be the virtual collapse of research activity during the higher education crisis of the 1980s and the current shortage of team and networked projects.

This situation brings up the question of the mentorship of junior faculty and the supervision of graduate study. One of the most heartening features on the African university scene is the increasingly rare sight of a senior professor (usually one of the few who refused to "brain drain " or one who has "drained " back) supervising graduate students or working with junior colleagues on projects. The continuation of research and graduate study programs during the difficult years of the 1970s, 1980s, and early 1990s owes as much to the commitment of these caring survivors as to anything else. Unfortunately, more typical is the senior scholar who is too distracted by consultancies and project-oriented research to devote much time to graduate supervision or the mentoring of junior colleagues. Moreover, as senior faculty have aged and moved towards retirement, they are not being replaced at the rate required to maintain the appropriate levels of mentorship of junior faculty and leadership of graduate programs. Figure 2 illustrates the phenomenon of faculty aging in African universities.[5]

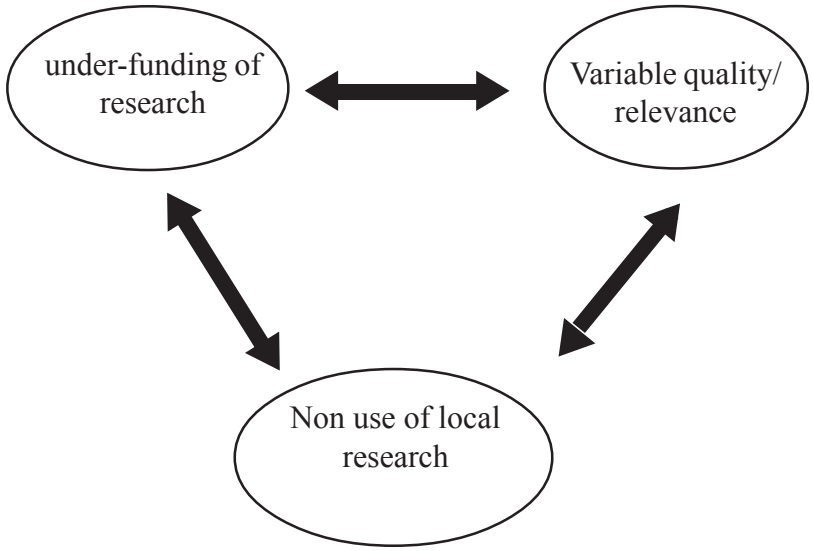
Figures 2: Universities of Ghana: Age profile of faculty (1998)



Against this rather somber general background, a number of challenges to research capacity development in Africa may be identified. The first is the deterioration in the general standard of education in many countries. This condition has apparently depressed the general level of intellectual activity in those countries, reducing the pool of talent from which future researchers are drawn. In the 1970s, 1980s, and early 1990s, political and cultural intolerance and the general discouragement of close probing and questioning of the establishment in many parts of Africa colored the environment for research, especially in the social sciences. A third challenge is the frequently problematic relationship between the variable quality and relevance of much local research on the one hand and, on the other, the limited local utilization and support for research. The variable quality and relevance of local research is used to justify its nonuse and nonsupport. Yet such nonsupport compounds the nondevelopment of research competence. The interactive and reinforcing nature of these factors is highlighted in Figure 3. Clearly this vicious cycle must be replaced by a positive one that involves simultaneous support for, and improvement in, local research and its increased utilization for the benefit of society. The continued dominance of individual rather than team or multidisciplinary work, especially in social science research, tends to limit the capacity of African researchers to undertake fundamental work with the many-sidedness required to achieve breakthroughs in modern science. Although this is a generalization to which there are many and important exceptions, it has to be acknowledged that the general situation represents a bottleneck to research and research capacity develop-

ment. The related weakness of graduate study and postdoctoral training and its effect on the research environment has been mentioned.

Figure 3. Interactive Bottlenecks: The Challenges.



Another problem area is the response to pressure to undertake "end-user friendly " research. Such pressure can arise either from a concern to be socially relevant or from the need to satisfy a client, as in the various forms of contract research. Given the overwhelmingly public support for most research in Africa, the concern to be socially responsible is entirely understandable, while the low levels of researcher incomes make recourse to outside funding, especially contract research, irresistible. Whatever the motivation, however, there is a tension between user-friendliness and two of the key drives for research excellence: (a) the scientific interest of the researcher and enthusiasm for the subject of inquiry, and (b) inspiration from theory or other research. Wherever the concern for direct relevance and applicability overrides either of these drives, sustainable, creative research is unlikely to result, nor is research capacity development likely to be enhanced.

This is not to say that consultancies and other commissioned work are necessarily inconsistent with research capacity development. The core elements of data gathering, analysis and, to some extent, verification are common to both academic research and good consultancy work. Properly regarded and

managed, consultancies and other contract work help strengthen both institutional and individual research capacity. This is particularly important where such work directs attention to areas of urgent social and economic demand, brings in or provides access to equipment and facilities not otherwise available to researchers, or supplements the incomes of the institution and the researcher. The critical task is to find the appropriate mechanism and balance for insuring a positive and mutually sustaining relationship between consultancy work and contract research on the one hand and, on the other, research capacity development, both individual and institutional.

Negative institutional conditions such as poor infrastructure (equipment, laboratories, libraries, and so forth) and lack of funding impose clear limitations on research and research capacity development. Moreover, full advantage has yet to be taken of the new electronic forms of communication for research and research capacity building in Africa. By speeding up communications and opening up access to knowledge and research findings worldwide, these developments present exciting opportunities for plugging African researchers into a flexible knowledge system and enabling them to leapfrog to the frontiers of knowledge. At the same time, they widen the gap between those with access to the new means and those without. But access alone is not enough. Researchers must be equipped with the appreciation and skills for accessing and appropriating such worldwide knowledge.

Other problem areas exist and exacerbate those already mentioned. Faculty carry heavy teaching loads without the benefit of modern teaching aids nor even the traditional support of teaching assistants. Given the overall resource constraints, involvement of academic staff in nonacademic activities is a common means of supplementing low official incomes. These debilitating distractions from core teaching and research tasks are reinforced by poor incentive systems, including slow promotions arising in part from the limited access to publishing outlets and international conferences and seminars, as well as the absence of mentoring by senior colleagues and a critical mass of other researchers.

The cumulative effects of all these trends and factors have fallen disproportionately on what has been termed “the third generation ” of African scholars (Mkandawire 1995, p. 7). The “first generation, ” educated mostly in the 1960s and earlier, were generally trained to the highest international standards at public expense, both at home and abroad, and had embarked on academic careers under conditions that respected and provided adequate means for the cultivation of knowledge. The “second generation ” came of age in the 1970s and early 1980s, when it was still common to supplement local degree work with graduate study abroad. But so harsh were economic conditions at home that

almost anybody who could remain abroad after graduating did so. They are the brain-drain generation. By the mid-1980s, access to opportunities for study abroad, especially in Europe, had so diminished that most had to undertake their entire education, from first degree to doctoral studies, at home. This occurred at a time when the range and currency of library holdings, as well as the quality of teaching and research at most African universities were in decline. It is this "third generation, " currently staffing our universities, that has borne the brunt of these severe declines.

Given all these challenges, it is time to turn to strategies and possible answers. Let me underline the fact that any strategy for reviving and building up the research culture in African universities must insure the continued reproduction and revitalization of the academy in Africa by targeting the third generation in a decisive manner.

What Answers?

The response to the challenges of research capacity building in African universities must involve improvements in the *environment* for research and research capacity development, both institutional and general. It must include, in addition, programs focusing directly on the *active* or human component in order to raise the capacity of individual researchers and build a critical mass of competent researchers. In what follows, I consider among the possible measures for improving the research environment, the issues of funding, strategic planning, and improved research management, the strengthening of graduate study and areas of strength, and collaboration with off-site research centers. While graduate study and sandwich programs bear on the human dimension of capacity development, I mention also staff development and other measures directly targeting the third generation.

Initiatives Targeting the "Environment Component " of Research Capacity Development

Funding

The base problem is that of funding. There are not enough resources, public or private, devoted to research and research capacity building. Excluding the one fully graduate institution, the AAU study found that, by 1993-1994, none of the responding universities spent even 4% of their recurrent budgets on research. The range was from 0.33% to 3.78%. To be sure, much research is funded by donor grants. But it still remains a matter of concern, recognized and lamented by all, that universities are willing to devote so little of their budgets to research. Shabani's (1996) data make all too clear how severe the problem is. (See Table 2.)

Table 2: Research budget allocation from rercurrent budget for the period 1989-1994

University	Amounts in US Dollars ('000)					Percentage of Operational Budget				
	89-90	90-91	91-92	92-93	93-94	89-90	90-91	91-92	92-93	93-94
1. Antananarivo (Madagascar)		29.87	na	26.3	91.2	48.59	0.98	na	0.6	1.57	0.75
2. Enugu State University of Science and Technology (Nigeria)		na	na	na	na	na	na	na	na	na	na
3. Zimbabwe		na	1223.41	1104.67	1176.93	1079.75	na	4.29	4.75	4.14	3.78
4. Malawi		na	na	na	na	na	na	na	na	na	na
5. Yaoundé 1 (Cameroon)		na	na	na	291.02	272.26	na	na	na	2	1.77
6. Ouagadougou (Burkina Faso)		15.05	7.08	na	na	na	1.37	0.5	na	na	na
7. Université Nationale de la Côte D'Ivoire		174.02	na	na	na	na	0.98	na	na	na	na
8. Ghana—Legon		na	na	na	na	na	na	na	na	na	na
9. Uyo (Nigeria)		0	0	30.3	10.27	na	na	na	0.72	0.24	na
10. Suez Canal University (Egypt)		298.4	94.31	81.78	70.26	73.75	0.69	0.30	0.41	0.32	0.33
11. International Center Insect Physiology and Ecology (Kenya)		6300	3900	4600	4600	5000	55.26	34.21	65.71	54.76	55.55

Source: Juma Shabani, *Research Management in African Universities* (1996), Table 11.

In light of the underfunding of research and considering the strategic importance of local research capacity, it is necessary to insist on the indispensable role of public intervention, direct and indirect, as well as donor support for the revitalization of our institutions, and the upgrading and maintenance of local research and research capacity. In this connection, there is welcome evidence that external sponsorship of higher education and research in Africa is once more assuming increasing significance.[6] What is important is to insure that such support does not compound the problems of undue individualization and informalization discussed earlier. This requires greater emphasis on channelling resources and support through the university and other research institutions. It cannot, however, be stated too strongly that while such external support for research will provide a welcome respite in many cases, it cannot come anywhere near making up for the dramatic declines in public funding and, in any case, could not possibly substitute for genuine long-term public support for research in Africa. The strategic initiative belongs properly with the state.

At the same time, a major obligation rests on the higher education and research institutions themselves to do more to attract support and funding for research. They have to demonstrate to their range of constituents—from government to parents, from local communities to business firms—the relevance and importance, long-term and more immediately, of higher education and local knowledge generation. They have to develop a clearer focus on the question of relevance in contemporary circumstances. At least as important, there will have to be better communication and explanation of what is already being done. Despite the strictures of commentators about the lack of relevance in the research being conducted by African institutions, a glance at any listing of projects at any of our institutions will show much evidence to the contrary. Work is being done on agricultural products and systems development; control of any number of infectious diseases, including malaria, tuberculosis, and HIV/AIDS; food and energy conservation; economic policy; as well as social and humanities issues of all sorts and at all levels. While not all this research can claim to be of the highest quality, the problem is less that of relevance of theme than of connectedness to the appropriate constituencies and impact on policies, actions, and outcomes.

On this general question, I may refer to an innovative suggestion made in a study conducted as part of the AAU's "Study Programme on Higher Education Management in Africa. " The researchers found that most of the government departments they reviewed had funds for conducting a range of studies in support of policy or for monitoring its effect. Should university researchers adopt a more proactive posture, they could help departments identify their research needs, formulate appropriate research proposals, and contract to do the re-

search (Djangmah & Anyimadu 1997). This way, the government departments would benefit from research as a basis for policy making and advice, and researchers would get funds to do research in their fields of interest and earn some income without departing from academic work.

While applied research and consultancy work will be necessary, a good case can and should be made for more basic intellectual production and its relation to the destiny of our societies, now more than ever. Our institutions of higher learning should activate and work with constituencies within society in support of their mission and production. Much could be learned from preuniversity institutions, which have for decades taken advantage of this possibility.

Strategic Planning

At the institutional level, the goal should be the restoration of research to its proper place in the strategic plans and actual expenditure patterns of all universities including the improvement of research infrastructure of all types, the provision of appropriate materials, and professional incentives. There can be little doubt about the enormous difficulties such a project entails in the face of the parlous condition of most university budgets. It is, nevertheless, essential to keep emphasizing that, without ongoing research, meaningful research capacity building in Africa is inconceivable; and in the absence of such capacity, the generation and application of new knowledge—the condition for all development—will continue to fall short of the requirements of the 21st century.

Some of the concrete programmatic initiatives for consideration and adoption through strategic planning are discussed below. These include the strengthening of graduate study programs; the identification of institutional areas of strength in combination with a strong push for regional cooperation—enabling institutional specialization, the concentration of resources, and the interinstitutional pooling of resources on a regional scale; and the facilitation of collaboration with off-site nonuniversity research efforts as a means of faculty and institutional development. Other measures are the promotion of research management as a specialized field to strengthen management capacity, and the provision of a "soft landing " for young faculty as well as staff development opportunities to address the special problems of the third generation of African faculty.

Graduate Study

Turning away from the big issues of a more strategic positioning and better resourcing of research and research capacity development and sustenance, a number of specific, more limited measures suggest themselves. An obvious

measure for improving both the institutional and the human aspects of research capacity development has to be the revitalization of graduate study. This goal calls for a variety of measures including substantial improvements in library holdings, both specialized and general; expanded access to current literature; a widening of Internet access and use, especially by graduate students; and the provision of appropriate incentives to senior scholars to devote attention to the supervision and mentoring of graduate students. Further, avenues for the dissemination of Ph.D. (and master's) dissertations should be expanded. In addition to conventional journal and monograph publications where severe weakness constrains all research, electronic publication as contemplated in the AAU's "Database on African Theses and Dissertations " (DATAD),[7] can help to ease the dissemination bottlenecks facing African graduate research results. Not only will this project provide an incentive to graduates by exposing their work to a wider readership, but it will also make African graduate research products more readily available to African and international researchers and users.

Given existing resource constraints, graduate study in African universities could be enhanced by increased recourse to split-site or "sandwich programs " for doctoral studies, combining work at the graduate's home institution of the graduate with periods spent on research, reading, or course work at another institution. Such programs, which are already in operation in many institutions, have advantages (as well as disadvantages!) over full-time doctoral study abroad, including, among the most obvious, increased local relevance of themes and topics, reduced likelihood of brain drain, and lower costs.

Areas of Strength and Regional Cooperation

Few African institutions are in a position to excel in more than two or three areas of research specialization. It has therefore been suggested that individual institutions identify and concentrate on building up special institutional capacities in a limited number of areas of strength, actual or potential. Concentration of graduate study in the selected areas may then be expected to facilitate the building of the necessary critical mass. Unfortunately, in the past, this commonsense approach has proved difficult in practice. There is enormous pressure to teach all approved disciplines despite conditions of scarce resources, and few universities are able to negotiate the turf jealousies inevitably sparked by any move that appears to favor one discipline or department over others. The elaboration and implementation of strategic plans in many African universities, which could have facilitated the necessary trade-offs, do not appear to have altered the situation much.

It remains the case, nevertheless, that in combination with regional cooperation arrangements crafted to insure effective complementarity and sand-

wich graduate programs sponsored by member institutions, the areas of strength option holds particular promise. Apart from a further lowering of costs and the facilitation of regional networking, the combination promises mutual strengthening of such areas by bringing in extra resources and contributing to the creation of a critical mass of graduate students in the areas across institutions. This is exactly the thinking behind the AAU's project for Regional Cooperation in Graduate Training and Research. Briefly, this project, still in its pilot phase, has supported the formation of six clusters of institutions to collaborate in research and training in specialized areas selected by the cooperating institutions themselves.[8] Though only in its second year of full operation, the experiment shows much promise.

Off-Site Collaboration

The threat posed to university research by the emergence of off-site research centers has been noted. This threat is balanced by the consideration that the diversification of sites offers considerable potential for collaboration and synergy. The potential for the pooling of talent and resources and for the productive division of labor and complementarities cannot but benefit research in general and the underresourced universities in particular.

Research Management

With the increasing recourse to project research, research management has to be better organized and more professional. Appropriate policies, systems, training schemes, and incentive structures must be devised to encourage and facilitate large-project development and implementation, care being taken to preserve the core values of university-based research. In other words, research should be concept led and teaching related. Matters to be tackled include guidance of staff about opportunities for funded research and how to access them; development of expertise in such matters as contract development; intellectual property and ethical issues; and the marketing of research capacity to the appropriate public. It has been suggested that this might best be done by establishing a central research management facility within an institution and by making research management a profession (Association of Commonwealth Universities 2001). On this latter point, attention should be drawn to the unfortunate practice of heads of departments and senior faculty appropriating to themselves all invitations to international seminars and conferences.

Soft Landing and Staff Development

Together with a renewed emphasis on local graduate programs, it is necessary to create conditions for a soft landing for new appointees to the faculty (the

third generation), through initially lighter teaching loads, special support services, and, wherever possible, attachment to senior colleagues as mentors. Younger faculty members should be motivated and given incentives for constant self-improvement and the widening of horizons. Other measures might include their insertion into research groups led by senior scholars, as well as support for conference attendance and short foreign attachments.

Such actions would call for a deliberate policy of forbearance on the part of senior colleagues, directing as many international and developmental opportunities as possible to younger faculty, and helping them prepare adequately for effective participation. Such an approach should go some way toward making up for the generally weaker preparation of younger faculty members for academic work and reducing the danger of undue parochialism. The aim should be, in the first instance, to help the new entrants survive the shock of reentry without being demoralized to the point of leaving the institution or joining the ranks of the "living dead, " i.e., academics who for one reason or other do no research. Additionally, they should be strengthened to survive and transcend the often anti-intellectual environment into which they are thrust.

Special Initiatives Targeting the Active

Component of Research Capacity

Some significant initiatives have been developed at both the regional and national levels in recent times, aimed directly at the development of the active or human element in research capacity—that is, the skills and attitudes required of good researchers. The following instances provide illustration.[9]

Study Programme on Higher Education Management in Africa

In response to a perceived absence of African scholarly input into the search for solutions to the higher education crisis on the continent, the Association of African Universities (AAU), with financial support from the Dutch and Swedish governments, introduced the Study Programme on Higher Education Management in Africa in 1993 (http://www.aau.org/studyprogram/). The aim was to help develop local capacity within the association's member institutions for undertaking systematic research on issues of higher education policy and management and to increase the indigenous knowledge base of African higher education policymaking. Under a "Research Grants Scheme, " which is run in phases, the Study Programme has awarded grants for research on such themes as information and data gathering; resource mobilization and allocation; institutional culture; decision-making processes; higher education and work; higher education costs and financing; university management for quality and equi-

table access; graduate and employer survey; privatization of higher education: issues, factors, and trends, and student living and learning conditions.

A special feature of this scheme is that experienced resource persons supervise the research projects and that grantees are given intensive, often personalized, training in various aspects of higher education research through workshops and seminars. Participation in these training workshops is a condition for disbursement of tranches of the grant. When appropriate, grantees have undertaken short attachments at recognized centers for higher education research in Europe to help raise the quality of their work. In addition, grantees, particularly after the completion of their projects, are selectively sponsored to participate in international higher education conferences as part of their professional development.

Phase 1 of the Study Programme ran from 1993 to 1998 and was followed by Phase 2, which started in 1999 and ended in 2003. Altogether, 126 individual researchers have been trained and 43 research reports and 41 essays produced on aspects of higher education in Africa. These researchers are increasingly engaged in advising governments and universities, publishing on higher education issues, participating in international meetings, and generally contributing knowledge and insights on higher education issues in Africa. Proposals for Phase 3, scheduled to begin in 2003, have been under consideration.

Working Groups and Summer Institutes

The Council for the Development of Social Science Research in Africa (CODESRIA) (http://www.codesria.org/) contributes to capacity building in the social sciences with the financial support of a pool of donors by running the following programs: Multinational Working Groups (MWG), National Working Groups (NWG), Small Grants Programme for the Writing of Dissertations and Theses, and Training Institutes. The MWG brings together between 10 to 20 researchers from various disciplines and different countries within Africa, chosen through a rigorous selection process, to work on a competitively and specially selected common theme. In contrast, the NWG are self-constituted groups of researchers in a country, working on a theme of their choice.

Under the Small Grants Programme for the Writing of Dissertations and Theses, laureates are competitively selected and given small grants to help them complete their graduate theses or dissertations. Since this program's inception in 1988, more than one thousand grants have been awarded. Of these, 419 had been completed by 1995.

Under the Training Institutes Programme, between 10 and 20 young researchers are brought together from all over Africa for a five to seven week

intensive interactive session with experienced resource persons. The themes of the institutes include: democratic governance, gender, and children and youth.

While the AAU and CODESRIA programs outlined above have so far covered only limited numbers and have relied heavily on donor support, their value has been in pioneering approaches that, with appropriate modifications and improvements, show what could be done by African regional institutions.

Capacity Development Programme

The Centre for Science Development (CSD), a division of the Human Sciences Research Council (HSRC) of South Africa, pursues a "redress program " aimed at strengthening the research capacity of historically disadvantaged individuals and institutions, in response to imbalances in social research capacity created during the period of apartheid. The program provides funding for research grants and graduate scholarships in the humanities and social sciences. In addition to running workshops on research processes, women in research programs, and internship and fellowship programs, the CDS supports collaborative regional research training, promotes the use of research information systems, and encouragement more intensive use of technology.

The National Mathematical Centre (NMC)

The NMC of Nigeria was established in 1988 to train and develop experts in the mathematical sciences for Nigerian and African institutions, to serve as a national and international focal center for advanced research in the mathematical sciences and their applications, to enhance collaboration between young Nigerian scientists and experienced local and international scientists, and to establish a visiting program for mathematical scientists. Its students have come from countries like Benin, Côte d'Ivoire, and Togo, while faculty have been from all over the world.

Conclusion

As the 20th century drew to a close, the countries of Africa were making a concerted effort to reposition themselves to meet the challenges of development and social advancement in the context of accelerated globalization. The consolidation of democratic governance and the stabilization and reform of economic systems at the country level was complemented by increased cooperation and mutual support at the subregional and continental levels. A major hurdle remains in the development effort. This hurdle is the knowledge deficit arising from the limited capacity of indigenous institutions for generating and applying modern knowledge to production, management, and social life in gen-

eral. Both history and more recent political and economic developments account for this unfavorable situation.

One of the tragedies of the last two decades of the 20th century was the running down of the education systems as part of the general decline in the economic and social conditions in most African countries. Especially paradoxical was the underfunding of higher education at the very moment of the rise of the knowledge society and its spread throughout the globe. These factors only exacerbated the knowledge deficit. Thus, the reversal of policy, combined with deliberate support for the revitalization and strengthening of indigenous knowledge institutions must be part of the drive to reposition Africa favorably in the current global dispensation.

Against that background, the current refocusing on the regeneration and redirection of Africa's universities and other institutions of higher education and research by both governments and donors gives cause for hope. Crucial elements for the success of this general effort include improving the calibre of researchers at these institutions and the conditions under which they work. In this connection, particular attention needs to be paid to the enhancement of the capacity of researchers, working individually or in teams, to undertake essential research and maintain a positive culture of inquiry and innovation. But just as important are measures for the sustained reproduction of this cadre, its retention on the continent, and its full and effective engagement in knowledge production for the benefit of society. What this implies, and what does not receive enough attention, is an enabling macro environment within which universities and research institutions could operate effectively and within which they could achieve positive conditions, thus enhancing what I have called the environmental component of research capacity.

In discussing the key challenges and possible responses, I have identified the continuing resources squeeze as the core problem, as it colors all policy making and many of the other conditions as well. The solution to this problem, to the extent that it turns upon the health of national economies and public allocation policies, is far beyond the scope of this discussion. My concern has been with what can be done under current conditions. For a start, the resource limitations should serve to concentrate the mind, highlighting the need to prioritize in order to give due weight to research and research capacity development in the revitalization process and to identify and focus on those aspects likely to yield the most effective results under current and prospective conditions. The second point of note is the crucial importance that African universities and other institutions should themselves take up those aspects of the revitalization process that lie within their purview and which could be undertaken with a minimum of additional resources. I have mentioned, in particular, mea-

sures aimed at the strengthening of and selectively concentrating on graduate studies and the providing of incentives for attracting and retaining young faculty members.

None of the measures outlined and discussed above could by themselves transform the research scene in Africa nor remove the knowledge deficit. Yet together they will not only arrest the decline in research performance but, indeed, yield substantial immediate gains. Such gains could include regional collaboration in more vigorous graduate study programs; renewal of the faculty through the attraction, development, and retention of younger members; and improvements in the productivity of research through more efficient management and promotion. For the longer term, these measures could build into a momentum for development that, with improvements in the macro environment, could contribute to the maintenance of a knowledge generation and application base adequate to the needs of Africa in the 21st century.

Appendix: Makerere University

Funding Cutbacks

Makerere's financial resources from both public and external sources declined dramatically in the 1970s and 1980s . . . at the same time that the university was experiencing increasing pressure to expand enrolment. Makerere responded by admitting more students, but with fewer resources than it had had previously for smaller numbers.

The most obvious consequence of the decline in financial resources in the 1970s and 1980s was a sharp deterioration in the quality of teaching and learning. Makerere became a place of bare laboratories, empty library shelves, chronic shortages of scholastic materials, and overcrowded halls of residence.

The financial crisis had a major impact on teaching staff. Lecturers were demoralized by salaries that were not only meagre but often came late. . . . Many lecturers took other jobs, both within and outside of Uganda. . . . The lecturers who remained moonlighted as tutors, taxi drivers, or went into business in order to survive, using university facilities as their operating bases. Although many gave the odd weekly lecture, they had little time for seminars, tutorials, or one-to-one student contact, let alone research or intellectual debate.

There was virtually no application of information technology to either teaching and learning or institutional management during this period. Students remained without exposure to advances in information technology, and overall impact on the faculty was minimal. Administration and management processes remained almost totally manual.

Impact on Research

The university's research infrastructure and output suffered substantially. The university had built up a substantial research infrastructure whose outputs received international acclaim. In the first years after independence (1962–1970), political stability and the hopes created by independence brought new research initiatives to the university. Of particular note were the East African Institute of Social Research, which became the Makerere Institute of Social Research (MISR), the University Farm at Kabanyoro, the Medical School research program at Mulago Hospital and the Faculty of Science, especially in Botany, Chemistry, Physics, and Zoology. Under the regime of President Iddi Amin, most expatriate scholars and researchers left the country, donor agencies and other external financiers disengaged themselves, and collaborative research projects between Uganda and regional or overseas institutions were terminated. The government's preoccupation with economic rehabilitation and suppression of internal civil strife left research institutions and programs running on a maintenance-only basis. By the mid-to-late eighties, a few active research programs came to life with the sporadic return of external support, notably at the Veterinary Faculty, Faculty of Social Sciences, Faculty of Agriculture and Forestry, and Faculty of Education. However, this was funding for specific projects, generally in areas of the particular donor's interest, which did not improve the research situation of the university as a whole.

Small allocations for research resulted in poor facilities, limited access to publishing facilities, a limited research database, low output, and absence of a research culture. Other consequences were lack of appreciation of the importance of research, lack of skills to undertake research, lack of experience in research, low priority given to research at the university, and, in other public institutions, lack of centrally initiated and managed research and emphasis on financial gain as a motive for undertaking research. (Excerpted from Musisi & Nansozi 2001)

Notes

1 The author acknowledges the very thoughtful comments and advice on earlier drafts received from Tade Akin Aina, Amina Mama, Liz Lange, and David Szanton.

2 Paul Schultz's (2001) contribution to the same conference at which my paper was presented (Yale Center for International and Area Studies, African Studies and Economic Growth Center Conference on International Higher Education and African Development) provides useful illustrations from the fields of agriculture and public health of the importance of local adaptation, control interventions, and policy evaluation in ensuring the successful transfer of research results. Schultz's article also appears in this issue.

3 There is always great risk of oversimplification in talking of Africa as if it were a homogenous unit. I believe, nevertheless, that there are enough common elements to justify the general observations made in this paper.

4 This section draws substantially on a paper I delivered as the keynote address to a seminar on Social Science Research in West Africa organized by the Netherlands/ Israel Research Project in Accra, Ghana, November 19–20, 1997. The earlier address was published as "Bottlenecks to Research-Capacity Building in African Universities " (1997), in H. J. Masterbroek (Ed.), Social Science Research in West Africa: Seminar Proceedings (pp. 3-10) (Accra, Ghana: n.pub. (Netherlands/Israel Research Project).

5 The problem of aging faculty is reported from several universities, including Edouardo Mondlane University (Mozambique) (Mario et al. 2001), University of Dar es Salaam, Tanzania (Mkude et al., 2000), and Makerere University (Uganda) (Musisi & Nansozi, 2001).

6 Notable among these is the "Four Foundations Initiative, " by which the Carnegie Corporation and the Ford, MacArthur, and Rockefeller Foundations have undertaken to provide substantial amounts to support innovative programs in selected African universities. But full credit must be given to the few donors, including Swedish International Development Agency/Department for Research Cooperation with Developing Countries (SIDA/SAREC), the government of the Netherlands, and the Ford Foundation, which, against the trend, maintained support for African higher education and research right through the 1980s and 1990s.

7 The Database of African Theses and Dissertations Project (DATAD) of the Association of African Universities aims primarily at (a) building capacity in African institutions for the collection, management, and dissemination of theses and dissertations, and (b) increasing the visibility and accessibility of African scholarly work through publication on the Internet and on CDs. A project summary can be found at the Website of the AAU: http://www.aau.org/datad/.

8 A project description is included in the AAU's "Core Programme of Activities, 2001B04, " available at http://www.aau.org/coreprog/0104/themes.htm.

9 More detail appears in an appendix to the original paper presented at the conference, available from the Yale Center for International and Area Studies (YCIAS) Working Paper series: http://www.yale.edu/ycias/publications.htm.

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