AERC CREA

Research news

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Climate Change

Overview by Olu Ajakaiye, *AERC Research Director*

I am pleased to present this tenth edition of *Research News*, the second issue since the commencement of the AERC Strategic Plan for 2005–2010. Our intention as always is to provide a wide range of information about current economic issues and the results of AERC research.

The *Policy Forum* in this edition illuminates one of the most pressing issues of the day – ***Climate Change*** – and specifically its impact on sub-Saharan Africa. Climate change, sometimes referred to as global warming, in the context of environmental policy, is described as changes in modern climate caused largely by human action. Although its impact is or will be global to varying degrees, the economic costs and benefits of climate change are not likely to be equitably distributed across the regions of the world. Africa is projected to be severely affected because pre-existing conditions and its geographical location make the continent extremely vulnerable to the adverse effects of climate change. Therefore, African economists and their counterparts from elsewhere need to embark on rigorous analysis of the implications of climate change for the economic development of the region to provide a sound basis for effective policy and programme interventions by African policy makers and their development partners.

In this issue, this view is expressed in various ways. Prof. Ephraim Kamuntu, Minister of Tourism, Trade and Industry, Republic of Uganda, in his contribution on ***Issues in climate change and economic development in Africa***, points out that agricultural economies of Africa will suffer the most from climate change as the subsistence farmers will see immediate adverse effects of droughts and floods with deleterious effects on yield and food security on the continent. He, therefore, calls for urgent action by the African governments and their development partners in building capacity of African governments for participatory articulation and implementation of policies and programmes to respond to the challenges of climate impact, mitigation and adaptation issues. Prof. Anthony Nyong', Senior Programme Specialist at the International Development Research Centre (IDRC), Nairobi, in his contribution on ***Climate Change and Africa, Are We Doing Enough?*** states that despite the fact that Africa is highly vulnerable to climate change threats, African leaders are not paying enough attention to this issue. He, therefore, challenges the African scientists to do a lot more to establish the links between climate change and African development to provide useful guide to policy articulation and implementation; and Prof. Mahendra Shah, Senior Scientist at the International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria, in his contribution on ***Climate Change and Agriculture: Risks and Opportunities*** makes a similar observation and calls on national governments and the international community to give agriculture and the rural sector the highest priority in terms of resource allocation and adoption of locally relevant and globally consistent development policies aimed at responding to the threats of climate change.

Clearly, it is imperative to urgently build capacity of African researchers to conduct rigorous, locally relevant policy-oriented research into the consequences of climate change and the mitigation and adaptation initiatives being promoted at the global level. It is equally imperative to make the research results available to African policy makers as they seek to create a strong African voice calling for what Professor Kamuntu refers to as *climate justice*. It is envisaged that in the near future AERC will mainstream climate change into its thematic and collaborative research activities in order to respond to these needs identified by each of the three independent contributors.

As reflected herein, three new *Collaborative Research* projects are currently well under way. These are:

- Export Supply Response Capacity Constraints in Africa, with Impact of China and India on Sub-Saharan Africa as its sub-component
- Reproductive Health, Economic Growth and Poverty Reduction in Africa.
- Institutions and Service Delivery in Africa

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Overview

Upon approval of the concept notes by the AERC Programme Committee, a steering committee was set up for each of the projects. Thereafter, the steering committee members for each project elected a coordinator who prepared the full proposal for their respective projects for endorsement by the steering committees, after which the Secretariat commissioned the framework papers. Progress on each of these three projects, as well as a fourth project, similar to traditional collaborative research efforts, on ***ICT Policy and Economic Development in Africa***, are summarized in articles prepared for this issue by the respective project coordinators. Professor Samuel Wangwe of Daima Associate and the Economic and Social Research Foundation (ESRF) of Tanzania is the coordinator of the special project.

Members of the ***Export Supply Response Capacity Constraints in Africa*** project are Olu Ajakaiye, AERC (Chair); William Lyakurwa, AERC; Ademola Oyejide, University of Ibadan; (Coordinator); Phillip English, World Bank; Hakim B. Hamouda, United Nations Economic Commission for Africa (UNECA); Patrick Low, World Trade Organization (WTO); John Nash, World Bank; Dominique Njinkeu, International Lawyers and Economists Against Poverty (ILEAP); and Mohammed Salisu, African Development Bank (AfDB).

Ademola Oyejide, Francis Mwega of the University of Nairobi and Mike Morris of the University of Cape Town are jointly coordinating the subproject on ***The Impact of China and India on Sub-Saharan Africa***.

The steering committee for the ***Growth-Poverty Nexus*** project comprises Olu Ajakaiye AERC (Chair); William Lyakurwa, AERC; Ali A.G. Ali, Kuwait Planning Commission (Coordinator): Ernest Aryeetey, University of Ghana; Erik Thorbecke, Cornell University; Ibrahim A. Elbadawi, World Bank; Machiko Nissanke, School of Oriental and African Studies (SOAS), University of London; Andy McKay, University of Sussex, UK; Benno Ndulu, Deputy Governor, Bank of Tanzania; and John Mbaku, Webber State University, USA.

Members of the Steering Committee for the subproject on ***Reproductive Health, Economic Growth and Poverty Reduction in Africa*** project are Olu Ajakaiye, AERC (Chair); William Lyakurwa, AERC; Germano Mwabu, University of Nairobi (Coordinator); Ali A.G. Ali, Kuwait Planning Commission; David Bloom and David Canning, Harvard School of Public Health; Alex Ezeh, African Population and Health Research Centre, Nairobi; Erik Thorbecke, Cornell University; and Joseph Wangombe, University of Nairobi.

Finally, the Steering Committee of the ***Institutions and Service Delivery in Africa*** project is composed of Olu Ajakaiye AERC (Chair); William Lyakurwa, AERC; Mwangi Kimenyi, University of Connecticut (Coordinator); Paul Collier, University of Oxford; Akpan Ekpo, University of Uyo; Ritva Reinikka, World Bank; Adedoyin Soyibo, University of Ibadan; and Desire Vencatachellum, AfDB.

So far, review workshops have been held to present the framework papers for Export Supply Response Capacity Constraints in Africa, Reproductive Health, Economic Growth and Poverty Reduction, Institutions and Service Delivery in Africa, and ICT Policy and Economic Development in Africa. Participants at these review workshops included prospective country case study authors and policy makers from relevant policy organizations including ministries of trade, finance and planning, health, communications, central banks as well as regulatory agencies. This is in keeping with the strategy of involving the policy makers early in the collaborative research process in order to promote uptake of the research findings in the policy process and enhance policy impact. The framework papers for these projects have been revised and they are in the publication process.

Also, calls for research proposals for the country case studies for Export Supply Response Capacity Constraints and Reproductive Health, Economic Growth and Poverty Reduction projects have been posted on the AERC website and circulated among network members. Grants have been issued for the case studies on this project and a methodology workshop for the researchers met in Abuja in October. The proposals on Export Supply Response Capacity Constraints are currently being reviewed and we expect to commission the country case studies shortly. For the subproject on The Impact of China on Africa, scoping studies have been commissioned and a review workshop on these will be held in late November, after which the 15 in-depth case studies will be commissioned.

The call for proposals for the Institutions and Service Delivery project and ICT Policy and Economic Development in Africa are being finalized for posting on AERC website, while the framework papers for the Growth-Poverty Nexus project will be commissioned shortly.

As part of our capacity building activities, we organized a technical workshop on ***Game Theory,*** for which the facilitator, Akin Iwayemi of the University of Ibadan, has provided a brief note for this issue's Research Methodology section. Rounding out the issue, as usual, is a list of new AERC publications and a selection of Abstracts of recent AERC Research Papers as well as the calendar of events.

I urge all AERC network members and stakeholders to go through this edition of *Research News,* which seeks not only to highlight the imperatives of capacity building for rigorous policy–oriented research in support of an African voice on the topical issue of Climate Change but also contains an update on major components of the AERC Research Programme. I hope you will find it both informative and enriching.

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Climate Change Paints a Grim Picture for Africa

*By Ephraim Kamuntu**

Over the past several years, the world has experienced significant changes in climate. These changes include – but certainly are not limited to – increases in average surface temperature, rainfall and wind movement. They have had considerable impact on human activity and natural systems.

According to the Intergovernmental Panel on Climate Change (IPCC) Assessment Report (Climate Change 2007), 11 of the last 12 years rank among the hottest years on record. Globally, sea-level rise has accelerated significantly. Mountain glaciers have melted and snow cover declined in both the northern and southern hemispheres and there have been more intense and longer droughts over wider areas since the 1970s, particularly in the tropics and subtropics. The world is caught between two dangerous extremes of droughts and floods.

All these changes have had cross cutting impacts over the entire African continent. They have brought significant reductions in water resources (lakes and rivers) and unprecedented disturbances in ecosystems through floods and longer dry spells. One result is an unprecedented reduction in agricultural and food production that threatens to condemn millions of Africans to hunger, starvation and death. Efforts to mitigate climate change and its multiple impacts are being pursued in Africa, but these have met formidable challenges and limited success.

Challenges of Climate Change in Africa

Countries African will be among those most adversely affected by climate change for two main reasons. First, computer models predict that tropical and semi-tropical countries will receive the most adverse changes. Some temperate and cold climates will actually initially improve under climate change, before they deteriorate in the next century. Second, agricultural economies will naturally suffer the most. As an obvious example, Airbus and Microsoft will continue to make airplanes and software, whatever the weather, but a subsistence farmer in a rural area will see immediate adverse effects caused by drought, floods and unpredictability of climate.

According to the IPCC's WGII Fourth Impact Assessment Report (2007), Africa is one of the continents most vulnerable to climate variability and change because of multiple stresses and low adaptive capacity. The report predicts that by 2020, between 75 million and 250 million people will be exposed to an increase of water stress caused by climate change.

Furthermore, agricultural production – and access to food – in many African countries and regions is projected to be severely compromised by climate variability and change. The area suitable for agriculture, the length of growing seasons and the yield potential, particularly along the margins of semi-arid and arid areas, are expected to decrease. This will further adversely affect food security and exacerbate malnutrition in the continent. In some countries, yields from rain-fed agriculture may be reduced by up to 50% by 2020.

Local food supplies are also projected to be negatively affected by decreasing fisheries resources in large lakes due to rising water temperatures, which may be exacerbated by continued over-fishing. And to further worsen the situation, it is predicted that towards the end of the 21st century, projected sea-level rise will threaten large populations in -low-lying coastal areas. Mangroves and coral reefs are expected to be further degraded, with additional consequences for fisheries and tourism industries. The cost of adaptation could amount to more than 5–10% of gross domestic product (GDP).

There is wide consensus that something is wrong and something must urgently be done about it. The world has been forced to start adapting to these changes and finding ways to mitigate the current trends, especially in global warming. Governments across the globe have found it necessary to design and implement policies to ensure that effective measures are set up to prevent a grim future and to mitigate current impacts of climate change.

The world recognizes that climate change is a global phenomenon and it is obvious that global cooperation is necessary to achieve significant results in the fight against climate change. Governments, with help from international environmental bodies, have embarked on implementing policies and frameworks to mitigate the impact of accelerated climate change and its effects on the population.

Problems Faced in the Fight against Climate Change in Africa

Numerous efforts and advances in the fight against climate change are in place on the global scene. One significant international effort is the Kyoto Protocol set up in 1997 with agreements on the global environment and sustainable development. The protocol went to great lengths to define the principles, institutions and action frameworks needed to check increasing climate change. As part of these provisions, it was agreed that developed countries were legally committed to reduce greenhouse gas emissions by at least 5% by the year 2012.

While the Kyoto Protocol has been ratified, key countries and major emitters, particularly the United States and Australia, have not signed it. Moreover, progress towards meeting the Kyoto targets by 2012 varies quite a bit, and it now appears that only a few countries are likely to meet their targets. Finally, major emitters including China, India and Brazil are not under any commitment to reduce emissions under Kyoto, because the convention only set targets for developed countries, even though China's emissions are about to surpass those of the United States. Even if Kyoto targets were fully met, it would still leave further reductions in a subsequent treaty, now being negotiated, to take effect after Kyoto expires in 2012. This remains a big challenge.

With global principles in place, it is expected that individual governments will design and implement effective policies down to the grassroots level. Particularly in Africa, however, where capacity and structures are lacking to carry out development policies effectively, there is urgent need for external assistance from the donor community in setting up structures to address such need.

Furthermore, given that such policies could contradict other urgently needed policies such as those for industrialization, land and infrastructure (energy, food security and agriculture, among others), it is important to provide a balancing act to effectively address environmental needs and other development objectives. It is noted that in 2004, for example, Uganda emitted on average 60kg of carbon dioxide per person. During the same period, carbon emissions in the UK amounted to almost 10 tonnes (9,560 kg) per capita and were double that in the United States of America – almost 20 tonnes (19,810 kg) per capita (CRS Issue Brief for Congress, John R. Justus and Susan R. Fletcher Resources, Science and Industry Division).

Uganda needs to develop economically, and economic development depends on energy use. Rigorous land use and transportation policies can reduce waste, while contributing to more pleasant and liveable cities. While Ugandans will continue to use wood and charcoal for cooking, Uganda urgently needs to match this use by planting trees to replace those that are cut. This can be done. Surprisingly, forest cover reflects development more than underdevelopment: Japan, with three times the population density of Uganda, has about three times more land covered by forest: 64% in Japan compared with 21% in Uganda.

Like other African countries, Uganda should think about how to integrate natural resource use into every area of policy. Most schools can have tree lots, tended by the students. This would not only provide a source of renewable energy for the school, but would teach students the importance of caring for the environment at a young age. Land use and transportation policies should be designed to avoid "urban sprawl", and keep cities within limits – this is one area where Africa can learn from North America about which mistakes to avoid. The time is now for agricultural policies to focus on crops that will resist heat and weather extremes, and to encourage peasants to practice irrigation, which is more efficient and will become increasingly important in the future. Uganda is adding almost a million citizens a year – one of the highest rates of population growth in the world. We need to think about where they will live and what measures we can take now so that the image of Uganda as the "Pearl of Africa" will not be simply some old history, but a living reality.

Finally, Uganda should work with other African nations to create a strong African voice calling for climate *justice*. It is only logical that the nations that have put most of the carbon into the atmosphere should take responsibility for ameliorating the consequences. Africa played almost no role in global warming. This problem was caused by the economic activities of the rich industrialized countries and consequently these countries should not only drastically cut their emissions but should assist the developing countries to adapt to climate change.

***Prof. Ephraim Kamuntu** is Minister of Tourism, Trade and Industry, Uganda.

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Climate Change and Africa: Are We Doing Enough?

*By Anthony Nyong'**

Media around the world are awash with stories of climate change, which has become the buzzword in almost every contemporary discourse. Several development agencies are actively engaged in programming for climate change. Even faith-based organizations are not left out of the climate change discussion. Experts have at various times declared climate change the greatest human tragedy in history, and the greatest market failure the world has ever seen. Many people consider it worse than the current threat of terrorism that is plaguing the world.

Few issues have so captivated – or polarized – scientists in recent times as the issue of climate. A long debate over the causes and potential impacts of climate change rages between those termed "climate alarmists" and those labelled "climate sceptics". It is also an issue that has set developing nations against most developed ones. The developing nations have accused the industrialized countries of causing global warming without accepting the moral responsibility to clean up their acts within the shortest possible time.

Where does Africa feature in all this discourse on climate change? What does it mean to us? What are the potential and possible threats of the phenomenon and its impacts on the continent?

The Facts of the Matter

I believe that climate change is real and we need to pay close attention to it. The United Nations Inter-governmental Panel on Climate Change (IPCC) has confirmed this and also that humans are largely responsible for the phenomenon. Since the industrial revolution began in 1750, atmospheric carbon dioxide (CO_2)has increased by 34%, atmospheric CH_4 has increased by 154% and atmospheric N_2O has increased by 22%. These are the so-called greenhouse gases, and scientists believe that their increased concentrations are related to industrial activity and have led to unprecedented global increases in temperature, particularly over the last 50 years.

Observational records show that the continent of Africa became increasingly warmer through the twentieth century, and by 2000 was warming at a rate of about 0.06˚C per decade. The five warmest years in Africa have all occurred since 1988. Now several climate-change **experts are forecasting** that, globally, 2007 will be the warmest year on record, with fierce weather patterns that will bring severe hardships to millions of people around the world, particularly in Africa.

While most studies, including the IPCC Fourth Assessment Report, have concluded that Africa is very vulnerable to climate change, Africa's contribution to the phenomenon through greenhouse gas emissions is insignificant. When comparing the greenhouse gas emissions per capita in the typical African country with those of the typical European country, the Europeans emit roughly 50–100 times more, while the Americans emit 100–200 times more.

The question then is, Should Africa be made to suffer for what it is not guilty of? The answer is obviously a resounding "NO!" It was in recognition of this that the Kyoto protocol was proposed in 1997 where ratifying industrialised countries must reduce their human-induced greenhouse gas emissions by at least 5% below 1990 levels in the commitment period 2008–2012. Major polluting countries such as the USA and Australia have refused to ratify this protocol. Others that have ratified the protocol have not shown enough commitment to reducing their greenhouse gas emissions.

However, the Kyoto Protocol is not an immediate solution to the problem of global warming. Studies have shown that even if the Kyoto emission reductions are attained, atmospheric (CO_2)will continue to increase. To stabilize (CO_2)emissions at a level that will not cause dangerous climate change impacts, it is proposed that global per capita emissions will have to be cut by 45% by the middle of this century. The onus is on the industrialized countries to do this. The developing countries need to come together with a strong voice and with the support of the United Nations to demand this of them.

Apathy towards Climate Change

Despite the knowledge that Africa is highly vulnerable to climate change threats, many African leaders are paying scant attention to the issue of climate change in the continent. It is very rarely addressed in our national/ regional policies and plans that govern even vital sectors that are very vulnerable to climate change. The reasons for this are really not that hard to understand.

Africa, particularly sub-Saharan Africa, is already grappling with enormous development stresses and climate change is just one more problem. These stresses place a huge burden on the continent's meagre resources and African leaders would rather commit these meagre resources to solving 'immediate' development problems such as the high poverty levels, high maternal and child mortality rates, low life expectancy rates, and so on. The critical issue here would be to justify the commitment of huge resources to problems that are not caused by Africans while leaving the more immediate problems that are generally acknowledged as being at the root of Africa's under-development. True as this may seem, the modest gains that Africa has achieved in the past decade can be undermined by climate change. There is therefore need to seek ways of incorporating these threats into our development policies and plans.

Another reason for the apparent apathy by African leaders may be the general uncertainty that still seems to surround the whole issue of climate change. At the continental level, very few African scientists have carried out detailed studies to illustrate the potential impacts of climate change on the continent's development. Most studies have been done by western scientists and it is understandable why some of their results should be regarded with suspicion. African scientists need to do a lot more to establish the link between climate change and the achievement of any real development within the continent. Our policy makers need good, science-based, endogenously derived evidence on which to base their policies.

Where Africa Is Vulnerable

Is climate change all about rising temperatures and sea levels? No, it's much broader than that. These phenomena are signs and symptoms of a wide range of climate changes with potentially disastrous consequences for life on the planet. Some of these disastrous consequences are already evident in Africa, and many more are projected to occur within the next few decades.

Warmer temperatures allow mosquitoes that transmit diseases such as malaria and dengue fever to extend their ranges and increase both their biting rate and their ability to infect humans. There is evidence of mosquito-borne disease outbreaks in previously unexposed highland communities, particularly in Eastern and Southern Africa, where temperatures have risen during the past century. It is estimated that towards the end of this century about 80 million additional people will be at risk of malaria, and economic loss from malaria could be about US$12 billion per year. Other diseases that may become more frequent include meningitis, Rift Valley Fever, cholera, and malnutrition arising from crop failures and reduced incomes. These health outcomes will be exacerbated by Africa's current heavy health burdens, poor infrastructure and suboptimal investments in that sector. Although most African governments have policies to ensure that citizens have access to good health care, how many of these policies have incorporated additionalities from climate change?

Rain-fed agriculture forms the mainstay of most African economies, contributing about 40% of the GDP and employing between 22% and 90% of the labour force. The impacts of climate change on agriculture and consequently on household and national economies are considerable. Projected impacts include a substantial decrease in the length of the growing season in many areas and a substantial reduction in areas that are suitable for agriculture. By 2080, an additional 70 million people will be at risk of hunger. Warmer temperatures could destroy commercial fish species, even as river flows are substantially reduced. Agricultural losses could be as high as 4% of the GDP in Central and West Africa. These impacts are sure to be exacerbated by other factors such as erosion, poor soil fertility and inefficient farming practices.

The African continent is a rich mosaic of ecosystems, ranging from the snow and ice fields of Kilimanjaro to the tropical rainforests of Central Africa to the Sahara and Namib deserts. Observable impacts of climate on Africa's ecosystem include a 25–35km southward shift in the Sahel between 1970 and 1990, and a loss of about 5 million hectares of forest per year between 1990 and 2000, largely to forest fires. Projections show that a significant proportion of the animals in many national parks in sub-Saharan Africa are at risk of extinction. More than 80% of Mount Kilimanjaro's ice has disappeared since 1912, with about one-third melting in just the last dozen years. At this rate, all of the ice is projected to disappear by 2020. Similarly, since the 1990s, the glacier area on the Ruwenzori Mountains has decreased by about 75%. Besides the impact on glacier-fed water supplies, this has serious implications for tourism in countries like Kenya and Tanzania that depend significantlyon tourism industry for employment and government revenue.

About 25% of Africa's current population is water-stressed, with the number expected to increase by 75–250 million people by 2020. There are very high inter-annual lake fluctuations and volatility in the Africa river systems, with about a 10% reduction in run-off estimated by the middle of this century. There is also correspondingly high inter-dependency where many countries share the same water basins. The surface area of Lake Chad has decreased from about 25,000 km^2 in 1963 to about 1,350 km^2 today. This reduction results from a combination of reduced rainfall and increased demand for water for agriculture and other human needs. Many households in the countries that share the Lake Chad Basin have lost their livelihoods, particularly those who depended on fishing. The same sad story applies to the Lake Victoria Basin where substantial reductions in water levels have been recorded. This has negative implications for energy security in the countries that depend on the lake. Impacts of climate change on Africa's water resources could precipitate conflicts and lead to "water wars" with severe economic consequences.

Many African cities are located close to the coast. It is estimated that between 2 million and 4 million additional people will be flooded out before the end of the century. About 30% of coastal infrastructure in Africa could be inundated by rising sea levels, leading to very significant losses in lives and livelihoods and a high cost of repairs. It is estimated that the cost of climate-related disasters in Africa over the next two decades could reach up to US$10 trillion. The case of the Mozambique floods is still fresh in our minds.

Implications for Economic Development

Climate change cannot be separated from Africa's development. The impacts of climate change can hinder the achievement of the Millennium Development Goals as every one of those goals is closely tied to climate. Falling agricultural output and deteriorating conditions in rural areas caused by climate change will directly increase poverty of households in poor countries, ultimately reducing the revenues of nations. On the other hand, climate variability and change with its attendant negative consequences will increase the spending of nations, worsening their budget situation. Overall, this will affect growth rates in Africa and slower growth could cause an increase in poverty and child mortality relative to a world without climate change.

Climate models estimate that the mean cost of climate change is predicted to be about 3% of GDP in Africa by 2100. Climate-driven reduction in GDP would increase the number of people below the US$2 a day poverty line by 2100 in Africa by about 100 million people. The consequences of this are enormous. For example, it could raise the child mortality rate, reduce access of health care and other social services, and generally worsen the quality of life of the greater proportion of Africans.

Greater resource scarcity, desertification, risks of droughts and floods, and rising sea levels could drive many millions of people to migrate – a last-resort adaptation for individuals, but one that could be very costly to them and the world. These could also precipitate international/ cross border conflicts and violence, as they have already done in many parts of Africa. Violence further exacerbates poverty; besides disrupting economic activities, vital financial resources needed for development are diverted to prosecuting armed conflicts. Resources diverted by conflict away from development are estimated at US$1 billion a year in Central Africa and more than US$800 million in West Africa.

There is a loss of investors' confidence in conflict-prone economies. As a result, there is a likely strong negative correlation between conflicts and foreign direct investment. Development assistance also suffers when major donor countries are involved in their own armed conflicts because enormous resources are channelled toward fighting them. The decline in such funds could have severe negative effects, particularly in countries that largely depend on foreign aid.

What Must We Do?

Mitigation and adaptation are the two principal ways of dealing with the threat of climate change. We can mitigate by reducing the greenhouse gas emissions into the atmosphere, or we can adapt by preparing for and responding to changes in climate and associated threats. Because Africa contributes a very insignificant amount of the greenhouse gas emmissions, mitigation should not be Africa's priority. Efforts should be made by the industrialized countries to effectively pursue mitigation efforts. The laws establishing the United Nations Framework Convention on Climate Change place the moral burden on the industrialized nations to reduce their greenhouse gas emissions as well as assist the developing countries adapt to the adverse impacts of climate change.

Several funds have been established for this. Unfortunately, many of these funds contain pledges that are yet to be fulfilled. The ones that are redeemed have clauses that make it increasingly difficult for developing countries to take advantage of them. The industrialized nations need to do more than they are currently doing.

Many industrialized nations have adopted the posture of providing aid to African nations to help them combat the effects of climate change. No amount of aid can climate-proof Africa and shield it from the adverse consequences of climate change. The best form of adaptation is mitigation. The onus is therefore on the developed countries to reduce their greenhouse gas emissions so that Africa can properly adapt. If this does not happen, many African countries will increasingly see climate change as an act of aggression by polluting industrialized nations, a view being shared by many African leaders.

Even if the industrialized nations were to cut their greenhouse gas emissions and achieve the Kyoto targets, sea level rise and global warming would continue to increase over centuries because of the inertia in the earth's systems. The implication is that climate change will continue to be a burden to Africa. Africa also needs to rise to the challenges posed by this threat. Our policy makers need to identify that it is a current threat and not something that might happen in the future. Efforts should be made to climate-proof our development by factoring in the risks of climate change. Scientists need to do more in the area of correctly assessing our present threats and advising policy makers using science-based evidence. Unfortunately, African economists seem to be the last group to take these issues seriously. Until a clear link is made between climate change and Africa's economic development, I fear that policy makers will continue to shy away from it. African economists should be more involved in climate change research in Africa. ■

***Anthony Nyong'**, PhD, is Senior Programme Specialist, International Development Research Centre, Nairobi, Kenya.

Policy Forum

Climate Change and Agriculture: Risks and Opportunities

By Mahendra Shah*

Article 2 of the UN Framework Convention on Climate Change (UNCED, 1992) in 1992 established that the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system... should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner”. The climate change issue is global, long term, and involves complex interaction between climatic, social, environmental, economic, technological, institutional, and political processes.

In 1997, the international community negotiated the Kyoto Protocol (United Nations, 1997) in which the developed nations agreed to limit their greenhouse gas emissions, relative to 1990 levels. The Kyoto Protocol also proposed economic instruments such as the Clean Development Mechanism with certifiable emission reductions and land use and forestry changes dealing with carbon sink. The progress in implementation has been difficult, as national governments have been politically constrained as achieving the targets entails modifying high fossil fuel consumption lifestyles.

In many developing countries, natural resources are already threatened (Shah, 2005), as people strive to get the most out of land already in production or push into virgin territory. We now also face the new challenge of climate change, which will have a dramatic impact on the land, water, and biodiversity resources and ecosystems. Combating climate change is vital to the pursuit of sustainable agricultural development; equally, the pursuit of sustainable agricultural development is integral to lasting climate change mitigation and adaptation. It has significant international and intergenerational implications.

Climate Change and Agriculture

The International Institute for Applied Systems Analysis (IIASA), for example, has developed an integrated ecological, economic, and social policy modelling framework (Fischer, Velthuizen, Shah and Nachtergale, 2002) to assess the world food system in the twenty-first century. One of the main components is the agro-ecological zone (AEZ) framework, shown in Figure 1. This computes the spatial extent and productivity of agricultural resources and related crop and livestock production under various agricultural technology assumptions on a 5 x 5’ latitude/longitude global grid. These detailed biophysical results are then fed into national and regional general equilibrium economic models embedded in the world agricultural economy – the basic linked system (BLS). In the case of Africa, the BLS comprises two national models and five aggregated regional models.

The spatial country-level and regional IIASA results (Fischer, Shah and Velthuizen, 2002) compare the ecological and

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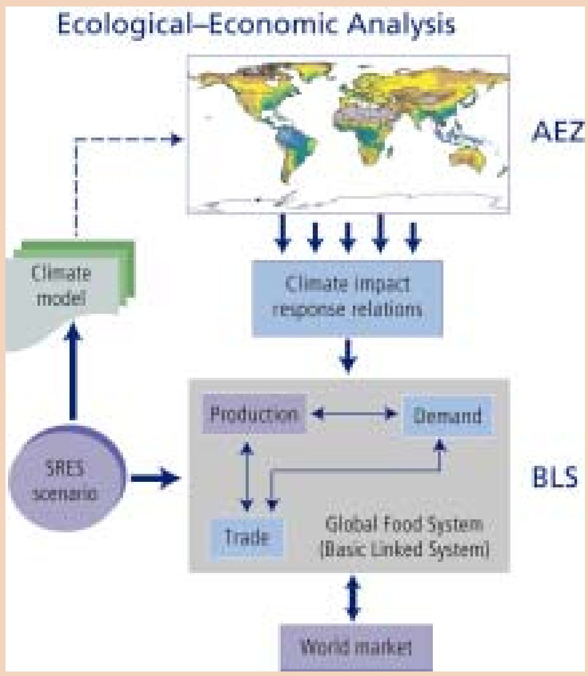
economic impacts on agriculture, and particularly the food systems, of the climate change projections of five general circulation models (GCMs), for a range of socioeconomic development paths projected by the Intergovernmental Panel on Climate Change (IPCC). This AEZ-BLS analysis permits an evaluation of constraints on land and water resources. It thus assesses where agricultural science and technology can be used to enhance productivity, the ways in which globalization affects agricultural livelihoods, the impacts of future climate change on food prices,

Figure 1. Framework for integrated ecological–economic food and agriculture policy analysis



trade, and consumption, and how policy options can be used to foster food security at the subnational, national, regional, and global levels.

Highlights of the Model Results

Analysis shows that the unused cultivable land available in the world today, 70% is found in just seven countries in South America and Africa (those in Africa are Angola, Democratic Republic of Congo and Sudan). There is little prospect of expanding arable land in Asia, making agricultural research and technology essential to enhance productivity.

The results also indicate that a major expansion of tropical zones, which apart from a very small stretch in South Africa and a narrow fringe along the Mediterranean coast, will cover almost all of Africa. This will result in the possible disappearance of the cultivation potential of rain-fed subtropical and temperate crops, for example wheat.

Agricultural Science and Technology

The model quantifies the yield gaps in areas currently under cultivation and allows us to evaluate ways of closing them. The future environmental constraints projected – for example, higher temperatures and water restrictions due to climate change – show where investments in targeted agricultural research (Shah and Strong, 2000) are needed to develop suitable and location-specific crop varieties.

The constraint-free prime land in sub-Saharan Africa decreases, according to the analysis, while land with moisture stress increases. Land with severe climate, soil or terrain constraints, prohibiting its use for rain-fed agriculture, increases in Africa by some 4% from the current area of about 15 million hectares. Southern Africa will be most affected by an increase of some 11%. The agriculturally unfavourable semi-arid areas (less then 120 days growing period) will increase by about 10% to 12 million sq km. At present some 180 million people in Africa live in such areas and rely on agriculture for their livelihoods.

Cereal Production Impacts

In the developed nations as a whole, potential cereal output increased by more than 8%, equivalent to about 200 million tonnes, as a result of climate change. In the developing countries as a whole, potential cereal output increased by less than 3%, equivalent to about 70 million tonnes. No improvements were found for sub-Saharan Africa. Some regions, for example in Southern Africa, lost average potential cereal production and at the same time saw a considerable increase in the variability of cereal outputs.

Agricultural GDP in parts of the developed world will benefit from climate change, whereas in many developing regions it will decrease.

Individual country results are reasons for concern. For example, some 40 least developed countries may lose up to a quarter average of their cereal production potential because of climate change in the 2080s. In these countries the average domestic per capita food production has declined by 10% in the last 20 years, in sharp contrast to an average increase of around 40% in the developing world. In these least developed countries, which account for 10% of the world's population and less than 1% of the world's income, the number of undernourished people has doubled to some 250 million in the past two decades.

Sub-Saharan Africa has the highest percentage of undernourished – about 40% of the total population – and there has been little progress on reducing hunger in the last 30 years. The results of the IIASA study highlight the plight of many countries. Sudan, Nigeria, Senegal, Mali, Burkina Faso, Somalia, Ethiopia, Zimbabwe, Chad, Sierra Leone, Angola, Mozambique and Niger lose cereal-production potential for projected future climate change, even under the assumption of the IPCC's very optimistic future economic growth in this region.

Globalization and Livelihood Security

Agricultural GDP in the developed world benefits, while developing countries, with the exception of Latin America, are confronted with negative impacts on agricultural GDP. In the 2080s Asia's GDP declines by 4%, Africa's by up to 8%, and Western Europe's by up to 18%, depending on the climate models and the IPCC scenario. In contrast, North America's agricultural GDP increases up to 13% and the Russian Federation's up to 23%.

The net cereal imports of developing countries will increase within the 170–430 million tonne range, depending on the future demographic and economic development pathway and climate change. Climate change will add to this dependence, increasing net cereal imports of developing regions by 10–40% according to

While the international community has focused on climate change *mitigation*, the issue of *adaptation* to climate change is equally pressing.

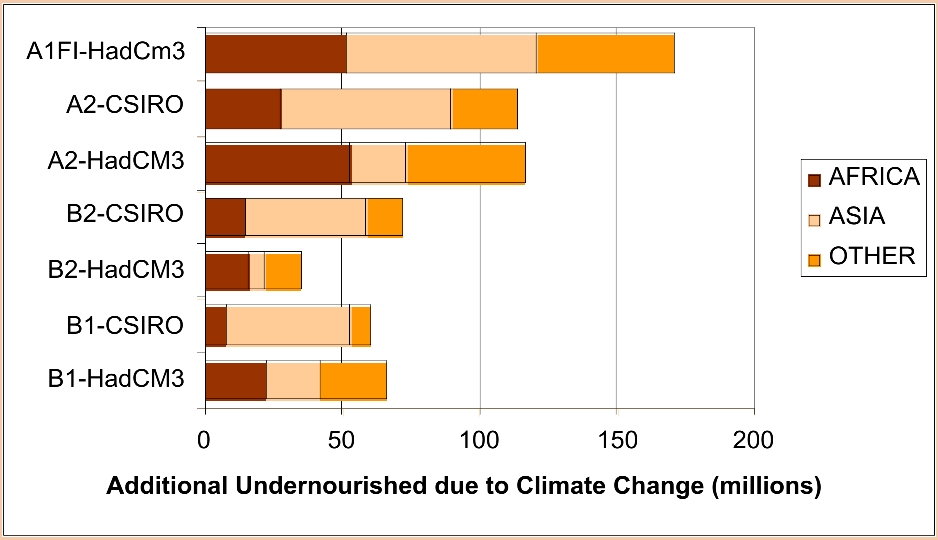
development path scenarios and GCM climate change projections. Such a substantial increase in world cereal trade also needs to be considered in the context of the economic and environmental cost of food transport over long distances as well as the inability of many food-insecure countries, particularly in sub-Saharan Africa, to finance long-term essential food imports.

Shortfalls in food production, caused by climate change, create market imbalances, which push international prices and provide incentives for reallocation of capital and human resources, thus mitigating climate change impacts by economic adjustments. For two of the GCM models and all emission scenarios, international prices for cereals rise 10–30%.

Global Environmental Change and Hunger

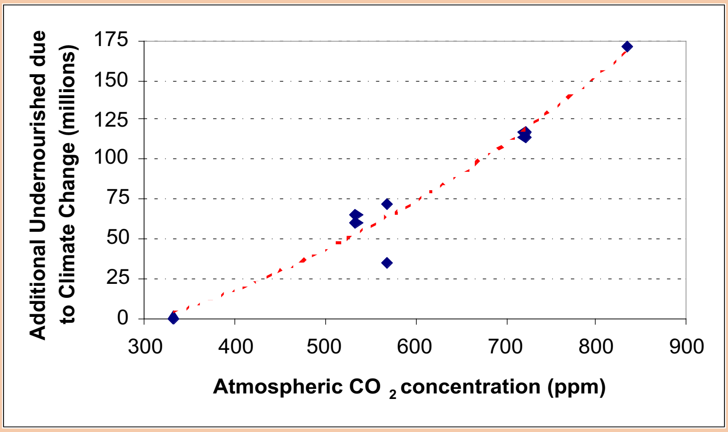
For the 2080s, IIASA results indicate little progress towards reducing hunger in the period to 2020, even in a situation of high economic growth. Figure 2 shows the additional number of people at risk of hunger in the world, plotted against different levels of atmospheric CO_2 concentrations and associated climate change. Figure 3 illustrates a regional comparison of the additional number of undernourished people, according to projected future demographic and economic development pathways and climate change. According to these results some 175 million people will be at risk of hunger as a result of future climate change.

Figure 3. Additional number of Undernourished people by region climate model and future development pathways



Climate change and variability will result in irreparable damage to arable land, water and biodiversity resources, with serious consequences for food production and food security. And most of these losses will occur in developing countries with low capacity to cope and adapt. While the international community has focused on climate change *mitigation*, the issue of *adaptation* to climate change is equally pressing. This is of critical importance to many developing countries that, to date, have contributed little to greenhouse gas emissions but whose food systems will bear the brunt of the negative impacts of climate change and variability. The IIASA analysis has relevance for assessing crop–land–water adaptation options as well as evaluating levels of agricultural greenhouse gas emissions and the prospects for mitigation.

Figure 2. Increase in undernourished due to climate change

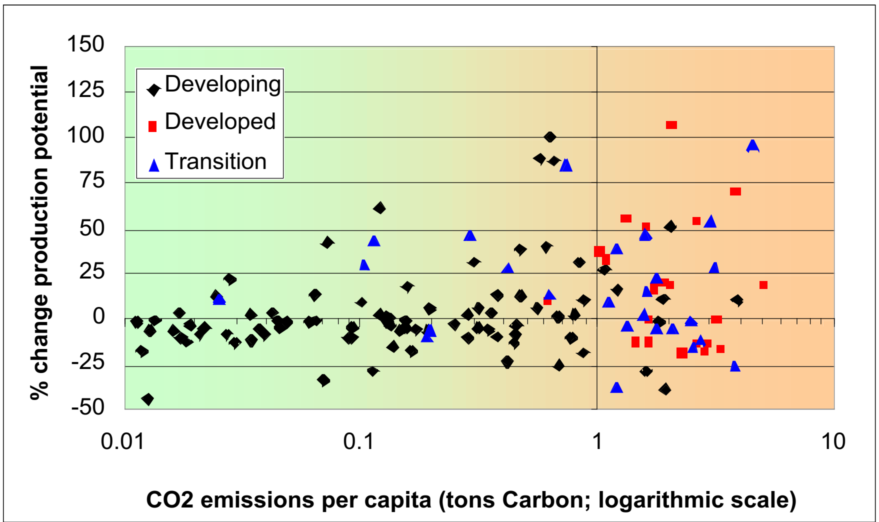


Climate Change – Fairness and Equity

Global warming raises the issue of fairness. The total carbon dioxide emissions of developing countries, which account for more than four-fifths of the world's population, amount to less than a quarter of global emissions (Figure 4). Yet, it is many of these developing countries that will suffer substantially from the negative impact of climate change.

An extreme example is that of Mozambique, already at the mercy

Figure 4. National cereal production loss and cumulative CO_2 emissions



of recurrent droughts or floods annually during the last 20 years. This is a country with 18 million people, of whom over 70% are undernourished, with a per capita deficit of a fifth of the minimum daily calorie requirement. Mozambique produces 0.1 tonnes of carbon emission per capita compared with the developing country average of 1.9 tonnes and the OECD average of 11 tonnes. Climate change may result in the loss of over 25% of Mozambique's potential agricultural production. Should this country be appealing for aid to the international community or should it be asking for reparations and justice as it bears the brunt of climate change caused by others?

The world community of nations must fairly and equitably meet the challenge of addressing climate change mitigation and adaptation policies and measures. It must take stock of the differences between nations in their past and future emissions, and must take into account prevailing socioeconomic conditions. The timely implementation of economically efficient and environmentally effective international agreements will be critical in the context of achieving worldwide societal goals of equity and sustainable development.

***Mahendra Shah** is a Senior Scientist at the International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.*

References

Fischer, G., H Vetlthuizen, M.M. Shah and F. Nachtergale. 2002. *Global Agro-ecological Assessment for Agriculture in the 21st Century – Methodology and Results*. RR-02-02. March, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.

Fischer, G., M.M. Shah and H. van Velthuizen. 2002. "Climate change and agricultural vulnerability"., WSSD, Johannesburg, South Africa.

IPCC. 2000. *Summary for Policymakers, Emissions Scenarios, A Special Report of IPCC Working Group III, Intergovernmental Panel on Climate Change*. Nairobi, Kenya.

Shah, M.M. et al. 2005. *Food and Ecosystems, Millennium Ecosystems Assessment, Ecosystems and Human Well-being,* Volume 3, Policy Responses, pp 175-212. Island Press, Washington, D.C.

Shah, M.M. and M.S. Strong. 2000. *Food in the 21st Century - From Science to Sustainable Agriculture,* Second edition. Washington, D.C.: The World Bank.

UNCED. 1992. *United Nations Framework Convention on Climate Change.* United Conference on Environment and Development, Rio de Janeiro, Brazil.

United Nations. 1997. *Kyoto Protocol to the United Nations Framework Convention on Climate Change.*Kyoto, Japan.

June 2007 Biannual Research Workshop

AERC's biannual workshops have long served as the main quality control mechanism for the thematic research modality. Prospective researchers present their already vetted proposals to their thematic groups for the benefit of commentary by resource persons and the other members of the groups. If approved they return to biannual to present either a revised proposal or a report of the actual research. The process is repeated for the revised proposals, and then again for the interim and final reports of the research work. Once the responsible resource person approves the final report, the Secretariat sends it to an anonymous referee for an additional, non-partisan critique. The author is then asked to incorporate these further changes and only when that is done does the final report enter the publications pipeline on its way to becoming an *AERC Research Paper.*

AERC research themes:
- Poverty, income distribution and labour market issues
- Macroeconomic policies, investment and growth
- Finance and micro/sectoral issues
- Trade, regional integration and political economy issues

Besides the researchers, the biannuals have since 2006 accommodated the students on the Collaborative PhD Programme (CPP). Students go through a similar process for their dissertation proposals and the interim and post field research results. These thesis workshops are intended to supplement the supervisory role of the respective universities, while providing a strict timetable for completing the PhD programme. A fifth reporting group was opened in the four thematic topics to allow room for the CPP students to participate each time.

Main findings of the final reports emanating from June 2007 Biannual Research Workshop are presented below.

Group A: Poverty, income distribution and labour market issues

Title & author(s) of paper	Main findings and conclusions
Social Capital and Household Welfare in Cameroon: A Multidimensional Analysis *By Tabi Atemnkeng Johannes*	The empirical analysis suggests that social capital affects positively on household income and food poverty by reducing the likelihood of households to be poor. On the other hand, the impact of social capital on health is negative. Finally, there is little indication of an observed impact of social capital on children's schooling and self-employment.
Valuation of Community-Based Financing of Poverty Reduction in Rural Cameroon: A Contingent Valuation Study of Households in the Bambalang Region of Ndop *By William M. Fonta, H. Eme Ichoku and E. Nwosu*	The empirical findings indicate that males are more likely to have a positive "willingness to pay" for the proposed Community Based Management project. This is because males, in the application context, are responsible for most of the household's financial involvements. Likewise, older people in the community are less migratory than the younger ones and therefore, favour facilities targeted toward the alleviation of poverty in the community. Finally, households expressing greater certainty would exhibit higher WTP, perhaps because individuals prefer choices with certain outcomes to those with uncertain outcomes.

Group B: Macroeconomic policies, investment and growth

Title & author(s) of paper	Main findings and conclusions
Incidence of the Fiscal System on Regional Income Distribution: A Micro-Simulated CGE Model for Côte d'Ivoire *By Bedia F. Aka and Souleymane S. Diallo*	The main findings of this study observe that increasing the tax rate on firms (simulation 1) had no impact on poverty and inequality, while reducing production taxes (simulation 2), and reducing import taxes (simulation 3) induced an increase in poverty and inequality. Overall, reducing import taxes (simulation 3) brings about welfare gain while increasing the tax rate on firms and reducing production taxes decreases welfare.
International Financial Integration in Sub-Saharan African Countries: Some Measurement Issues and Empirical Estimates *By Martin Ezo'o Bizeme*	The evidence suggests that a substantial number of SSA countries are financially open even though they are characterized by weak financial integration. Two reasons explain this low level of financial integration: a weak access to external capital markets and a lack of interest rate equalization.

Group C: Finance and resource mobilization

Title & author(s) of paper	Main findings and conclusions
Private Sector Incentives and Bank Risk Taking: A Test of Market Discipline Hypothesis in Deposit Money Banks in Nigeria *By Charles C. Ezema*	The study shows that deposit growth is sensitive to bank risk characteristics, while interest rates (inter-bank interest rates) also respond to bank risks. Deposit channels seem to show a stronger response, but these responses are stronger in weak banks than in healthy banks. Furthermore, banking crises of the late 1990s seem to have awakened depositors to their responsibilities. Although the quantity channel of depositors' discipline has been established, the results of the interest rate channel were not as clear. They imply that although depositors do monitor their banks and in fact do respond to their solvency risks, banks do not necessarily respond to the signals sent by depositors. Nevertheless, the fact that inter-bank deposit rates do in fact revert, it may be that banks are mindful of the ability of other banks to boycott them at clearing houses, a situation that sends a strong signal of insolvency to the entire market.
Mesure de la Performance des Banques dans les Pays en Développement: Le Cas de l'UMEOA (Measuring Bank Efficiency in Developing Countries: The Case of UEMOA) *By Sandrine Kablan*	The results suggest similar evolutions for the two types of efficiency (technical and cost efficiency) for every UEMOA country apart from Ivory Coast and Burkina Faso. Also, the study reveals that local private banks are the most efficient ones, followed by foreign and then state owned banks. Again, the Malmquist index shows that the increase of technical efficiency is much due to scale efficiency change than to incorporation of technological innovations. Lastly, the study finds that efficiency banks in UEMOA countries is sensitive to variables such as financial soundness, the ratio of bad loans per country, the banking concentration and the GDP per capita.

Group D: Trade and regional integration

Title & author(s) of paper	**Main findings and conclusions**
Determinants of a Firm's Level of Exports: Evidence from Manufacturing Firms in Uganda *By Aggrey Niringiye and Richard Tuyiragize*	The econometric results show that capital-labour ratio, firm size, foreign ownership ratio, education of the top manager and being an agro-based firm are the major determinants of propensity to export. The major determinants of propensity to export to Africa region were firm size and foreign ownership, compared to only being an agro based firm to the Western Europe region. On the determinants of the decision to export or not, foreign ownership was the only significant variable, compared to efficiency, capital-labour ratio, firm age, foreign ownership, education level of the top manager and being an agro based firm as the major determinants of how much to export.
Analyse Empirique des D terminants des Importations Alimentaires au Congo (Empirical Analysis of Food Imports Determining Factors in Congo) *By Leonard Nkouka and Mathias Ndinga*	The econometrical analysis revealed that the exchange rate of the local currency, armed conflicts, the re-exportation trade, the income per capita, and the index of the local production represent the main factors that account for the overall food imports of Congo. Efforts should be made to increase imports, in order to ensure food security in the country.
Trade Liberalization, Foreign Capital Inflows, Poverty and Income Distributions of Households in Ghana *By Vijah Bhasin*	The impact of trade related fiscal reforms on income distribution differs across households. The income distributions of the private sector employees and the non-working improve to a larger extent when trade liberalization is considered in isolation. On the other hand, the income distributions of agricultural households improve to a larger extent when trade liberalization is combined with foreign capital inflows and value-added tax. Financing of partial trade liberalization through domestic resources could have a greater impact on poverty alleviation and improvement in the income distributions of households than the foreign resources.

Group E: Political economy and sectoral policy issues

Title & author(s) of paper	Main findings and conclusions
Tourism and Reputation in Africa: Implications for Promoting Tourism Development *By Gbadebo Odularu and Kareem Olayinka*	Each of the models highlights different determinants of tourist arrivals in Africa. A comparative analysis shows that most of the facilities that are supposed to serve as tourist attractions are not readily available. However, air passenger carriage and a measure of effective transport services have the positive potential of encouraging tourists to African countries. Political and social instability, insecurity, and high crime rates in some countries are factors that have damaged the continent's reputation and have led to fewer tourist arrivals. Efforts to promote tourism development should consider these factors.
Governance and Economic Growth in Cameroon *By Fondo Sikod and John Nde Teke*	The study has shown that there is a direct relationship between governance and economic performance. As governance measures improve, the economic performance will also improve. Furthermore, an improvement in the quality of a country's institutions will increase GDP per capita. Policy makers aiming to improve economic growth in Cameroon should take these findings into account.
Productivity Growth, Catching Up And Efficiency Change In Sub-Sahara Africa Agricultural Production: 1961–2003 *By Olajide Ajao*	Total factor productivity (TFP) growth was observed for all sampled Sub-Saharan Africa countries, except Madagascar, Côte d'Ivoire and Sierra Leone. The sources of growth were found to be technological progress rather than efficiency change. However, countries on average are producing about 80% of the potential output that could be produced using the observed input quantities. Furthermore, it was observed that variables included in the model have significant impact on the TFP. Activities of rural development should take these findings into account and transform them into effective action, in order to improve agricultural production.

Export Supply Response Capacity Constraints in Africa

By T. Ademola Oyejide*

A series of AERC collaborative trade research projects has been motivated by the consensus in the literature that trade and trade policy matter for a pro-poor growth and development. Such policies therefore feature prominently in many African countries where poverty is endemic and rapid and sustainable economic growth is viewed as a major vehicle for poverty reduction. This series has examined various aspects of the relationships between trade and growth, as well as the factors that promote the expansion and diversification of trade in Africa.

This note focuses on the newest project in this series, which is examining "Export Supply Response Capacity Constraints in Africa". A short synopsis of the project reviews its motivation, objectives, component parts and modalities. In addition, the note highlights the key policy issues whose analysis drives the project, as well as some of the emerging findings and key messages of the frameworks papers.

Project Purpose and Scope

Previous AERC and other research on this subject broadly concluded that while most African countries face external market access barriers that are generally less constraining than those confronting countries in other developing country regions, improved external market access would not, by itself, be sufficient for strengthening African export performance. This existing body of research provides evidence that many African countries have not been able to take full advantage of the special market access opportunities available to them over time. These research findings provide a strong motivation for the new project.

In addition, this project derives its motivation from the practical realities facing African trade negotiators and policy makers. For instance, the participants from the policy community who attended the Dar es Salaam dissemination workshop on *African Imperatives in the New World Trade Order* strongly advised that AERC urgently embark on researching issues relating to the export supply response capacity constraints facing many African countries with a view to articulating appropriate policy measures for eliminating the constraints, and thus ensuring that these countries can derive maximum benefits from all available external market access opportunities. In effect, then, this project is "demand driven" by both previous research results and the practical needs of the African policy making community.

Export supply response capacity generally takes external factors as given and concerns itself primarily with the internal (or behind-the-border) factors that influence production and distribution costs and, thus, competitiveness. The central working hypotheses of this project are that the inability of domestic producers in Africa to respond quickly, effectively and efficiently to external market access opportunities is caused by various limitations of their internal supply capacity and that this, in turn, is largely responsible for the lacklustre export performance of many African countries.

The literature suggests that a wide range of factors influences export supply response capacity across Africa. In this project, these factors have been grouped into five modules of research issues. Thus, the project is examining whether, how and the extent to which each of the following groups of factors affect export supply response capacity:

- Trade-related infrastructure
- Trade-related inputs and services
- Compensatory and complementary measures
- Direct inputs
- Macroeconomic environment

Under Module A (trade-related infrastructure), research will focus on transaction costs associated particularly with transport, communication, information and time costs. The primary focus of research under Module B (trade-related inputs and services) covers energy and other utilities, finance and insurance services, quality assurance, security and trade facilitation. In researching the impact of compensatory and complementary measures (Module C), the project focuses on export and investment promotion, special export regimes, supply chains, aid-to-discovery, and aid-for-trade.

Module D consists of direct inputs into the production of export products; the main factors covered here include firm characteristics, quality of the work force, productivity, investment level, and growth and technology. Finally, Module E covers the macroeconomic environment where research focuses on inflation, level and dispersion of protection, exchange rate indicators, investment regime and the domestic regulatory framework.

These research issues are best addressed in the context of country case studies. It is assumed that there may well be quite substantial variations in the key factors that influence each African country's export supply response capacity. Further, these will be reflected at the firm level and the firm level effects are, in turn, determined by country-specific characteristics and policies. Thus, country case studies constitute a major component of this project. Before embarking on the country case studies, however, the project began with a set of framework papers. To set the stage and provide broad guidance for the country case studies the framework papers identified and analysed the main research issues, in addition to demonstrating the feasibility of the research methodology to be adopted.

Highlights from the Framework Papers

By design, the framework papers were structured around the five modules of research issues identified above. It is useful, therefore, to highlight the main messages emanating from the framework papers around the research issue modules.

Trade-Related Infrastructure

In their framework papers, Biggs (2007), Lyakurwa (2007) and Mbekeani (2007) provide a comprehensive survey of the literature on trade-related infrastructure, on the basis of which they offer significant stylized facts on Africa's deficiencies in this area as well as their impact on the region's export supply response capacity. They argue that the ability of a country to deliver goods and services at a low cost and on time is a critical determinant of its effective participation in international trade; and suggest that infrastructure development is a key element of this ability. In particular, transport is a major component of infrastructure to the extent that it provides physical access to markets – without which trade cannot take place. In addition, transport and communication play a crucial role in determining the competitiveness of a country's exports. More specifically, high transportation and communication costs can price a country out of export markets. The efficiency of the ports also matters; the greater this is the lower tends to be the transport and communication cost.

These framework papers show that the most immediate source of excessive trade costs in Africa relates to deficiencies in infrastructure; and that transportation is probably the most important infrastructural barrier to trade in the region. Poor transportation isolates markets from competition, reduces economies of scale and directly raises trade costs. For Africa's many landlocked countries, transport costs associated with trade constitute a binding constraint to trade.

As a result of their deficiencies in infrastructure development, many African countries suffer from several negative impacts with respect to their production and trade patterns. For instance, high transport costs of imports inflate the prices of domestic products. Lack of access to good quality transportation and communication services leads to reduced profit margins and competitiveness. In addition, poor transportation reduces the degree of specialization by African producers; and it renders many basic staple African foodstuffs internationally non-tradeable. On the basis of the various effects of infrastructural deficiencies discussed, these framework papers conclude that significant improvements in infrastructure should boost Africa's domestic production, enhance export expansion and diversification, and increase the competitiveness of the region's exports.

Trade-Related Inputs and Services

Several framework papers focus on trade-related inputs and services. Biggs (2007) and Njinkeu, Wilson and Fosso (2007) suggest that Africa's dismal trade performance may be linked to several trade facilitation factors, including complex customs requirements and lengthy non-transparent bureaucratic procedures, which, in turn, result in time delays and rent-seeking activities. They suggest that as a means of enhancing their trade performance, African countries should reform their trade facilitation services by rationalizing, simplifying and minimizing customs procedures through the adoption of electronic document filing and use of risk assessment policy for customs inspections.

Biggs (2007), Lyakurwa (2007) and Mbekeani (2007) identify electricity shortage as the single most important constraint to firm growth in Africa. The generally unreliable electricity supply and the associated frequent power outages interrupt production and drive up operating costs. The partial remedy provided by own generators is high cost and inefficient; it is, in any case, available only to the larger-scale enterprises. In a similar way, these papers show that the absence of an adequate trade finance infrastructure in many African countries hinders their trade competitiveness and export potentials. In particular, they argue that an environment with financial market imperfections and credit constraints, such as that in many African countries, is bad for export expansion and diversification because it raises finance costs. Again, as in the case of energy deficiencies, the burden of the impact of deficiencies of finance falls largely on small- and medium-scale enterprises, which are the least able to carry it.

Ignacio (2007) and Lyakurwa (2007) discuss the issue of standards, regulations and export quality assurance services. They suggest that regulations and standards create market access restrictions for African exporters, particularly the small- and medium-scale producers. The frequency of changes in regulations and standards and the imposition of varying regulations and standards across different markets cause diseconomies of scale and reduce the likelihood of African firms exporting to many markets. Ultimately, it is the relatively huge cost of compliance with standards and testing procedures that reduces the competitiveness of African exports, particularly of high-value non-traditional and processed food products for which the incidence of regulations and standards is greatest.

Compensatory and Complementary Measures

Several framework papers discuss a number of compensatory and complementary measures for promoting export growth and diversification. Oyejide (2007) argues that compensatory export incentives are meant to cancel out some disincentives for exporting that are generated by an economy's trade, investment and exchange rate regimes. In effect, they grant "free trade" status for exporting activities through free trade zones, bonded warehouses, duty exemption and duty drawback schemes. He offers, as an example of complementary measures, special export financing schemes for the provision of easy access to financing for exporting activities at affordable interest rates. From another perspective, Bacchetta (2007) recognizes the need, in some circumstances, for proactive government intervention. But he suggests that government intervention should be limited to two broad types. One of these relates to measures that are aimed at removing distortions created by policies which deter exporting activities. The other covers measures for addressing market failures without directly modifying resource allocation between specific (exporting versus non-exporting) activities.

Biggs (2007) and Kaplinsky and Morris (2007) discuss value chain analysis as an approach for assessing relative firm-level costs and productivities partly as a means of deciding where compensatory and complementary measures may be usefully applied. It is shown that in general and in the context of global value chains, African producers are confined to low-rent links where the returns to economic activity are low. It is suggested, finally, that to overcome their export supply constraints and expand their capacities, African countries need to situate their key industries within the global value chains that dominate these sectors.

Hoekman and Njinkeu (2007) offer the aid-for-trade (AFT) initiative as a potential instrument to help governments and the private sector address their export supply problems. Their paper argues, in addition, that African countries need to implement regional actions for addressing specific trade constraints, given the small size of most African countries and the fact that many of them are landlocked.

Direct Inputs

Biggs (2007) and Lyakurwa (2007) address various aspects of the role of direct inputs in export growth and diversification. They argue that low human capital and weak mechanisms for technology transfer and learning hamper export growth and diversification in African countries. Thus, while low labour cost constitutes a key relative factor cost advantage in Africa, this advantage is often offset by inflexible labour market regulations that keep wages high in the formal sector. In order to maintain competitiveness, many African countries may need low wages to offset their low productivity disadvantage. Moreover, they suggest that the most important constraint is inadequate mechanisms for transferring new ideas and promoting learning in these countries. In the long run, the central goal should be to develop the capacity for raising productivity and thus enabling workers to receive adequate wages.

Macroeconomic Environment

The framework papers by Biggs (2007) and Oyejide (2007) focus on various aspects of the macroeconomic environment and their impact on export competitiveness. It is shown that a country's trade, investment and exchange rate regimes influence the level and structure of production incentives which, in turn, determine the inter-sector flow of resources. More specifically, import restrictions act as a tax on exports and overvaluation of the currency hinders export competitiveness as it reduces returns to exports. In effect, it is argued that more liberal trade, investment and exchange rate regimes are likely to foster a more competitive macroeconomic environment and ensure greater efficiency in the allocation of resources that are better aligned to comparative advantage.

Conclusion

By deliberate design, the framework papers have focused on the broad picture while recognizing the inevitable variations across countries and exporting-activity sectors. The in-depth analysis of these variations constitutes the primary focus of the country case studies, the results of which may lead to a revision of the broad picture that has emerged from the framework papers. As several of these papers have pointed out, one size is not likely to fit all in matters relating to export supply response capacity constraints. Hence, national level policy making must reflect specific country characteristics, while joint action at the regional level should accommodate possible country level differences.

***T. Ademola Oyejide** is Professor of Economics and Director, Trade Policy Research and Training Programme (TPRTP), Department of Economics, University of Ibadan, Ibadan, Nigeria.

References

Bacchetta, M. 2007. “Releasing export constraints: The role of governments”. Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa. AERC, Nairobi.
Biggs, T. 2007. “Assessing export supply constraints: Methodology, data, measurement”. Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa. AERC, Nairobi.
Hoekman, B. and D. Njinkeu. 2007. “Aid-for-trade competitiveness: Lessons from the past and new opportunities for Africa”. Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa. AERC, Nairobi.
Ignacio, L. 2007. “Implications of standards and technical regulations on export competitiveness”. Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa. AERC, Nairobi.
Kaplinsky, R. and M. Morris. 2007. “The structure of supply chains and their implications for export supply”. Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa. AERC, Nairobi.
Lyakurwa, W.M. 2007. “The business of exporting: Transaction costs facing suppliers in sub-Saharan Africa”. Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa. AERC, Nairobi.
Mbekeani, K. 2007. “The role of infrastructure in determining export competitiveness”. Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa. AERC, Nairobi.
Njinkeu, D., J. Wilson and B.P. Fosso. 2007. “Trade facilitation: What is it and how does it help?” Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa.. AERC, Nairobi.
Oyejide, T.A. 2007. “African trade, investment and exchange rate regimes and incentives for exporting”. Framework paper for the AERC Collaborative Research Project on Export Supply Response Capacity Constraints in Africa. AERC, Nairobi.

The Impact of China and India on Sub-Saharan Africa

*By Francis Mwega**

China and India have established themselves as increasingly influential players across sub-Saharan Africa (SSA), driven by a more Africa-oriented foreign policy and their rapid and phenomenal economic growth in the past two decades or so. Over this period, China's economic growth averaged close to 10%, while that of India averaged almost 6% per annum. In purchasing power parity (PPP), China's gross domestic product (GDP) has increased 21-fold, and India's GDP more than eightfold over the same period. One of the most abundant resources available to China and India is their large populations, comprising two-fifths of the world's total, at 1.3 billion and 1.2 billion, respectively.

China's growth has been based on the development of an export-oriented manufacturing sector while that of India has been mainly grounded in its services sector. As a result, China has had a more conspicuous global presence over a much wider range of products than has India. In particular, the broad-based nature of China's industrial development has generated a sustained and high demand for many different types of raw materials (including oil), which has had a marked effect on international commodity prices. China's share in the recently increased demand for some mineral resources such as aluminium, nickel and copper varies between 76% and 100% (Kaplinsky et al. 2006).

The AERC Project

Clearly, the growth of the two Asian giants presents opportunities and challenges to the development prospects of SSA countries. The primary purpose of this collaborative research project is therefore to undertake a comprehensive analysis of the key features and patterns of the past, current and future evolution of the economic relations between specific (and groups of) SSA countries and China and India, respectively. This is intended to provide a basis for achieving a fuller understanding of the country- and sector-specific impacts of the relationships as well as an articulation of the appropriate overall and sector-specific policy measures that individual SSA countries may wish to take to advance their interests in the light of the impacts experienced and the opportunities and challenges faced.

The project consists of two major research components: framework papers and country case studies. These are complemented by related networking activities.

The Framework Papers

The framework papers, which are already completed, were designed to guide the country case studies in terms of the research questions to be addressed. The framework papers covered five major economic sectors – agriculture, oil and gas, solid minerals, manufacturing, and infrastructure – as well as one cross-cutting issue – politics and governance. The following is a brief summary of these framework papers.

Agriculture

In their paper, "The Impact of Asian Drivers on SSA Agriculture and Food Security: Issues and Challenges", Marios Obwona and Ephraim Chirwa point out that the strong economic growth in the Asian Driver countries (ADs) has the potential to stimulate increased trade in agricultural exports from SSA through the increased demand in food and non-food agricultural products. There are two pathways for this impact: increased exports to ADs and competition between ADs and SSA products in third and domestic markets. In some SSA countries, the growth of exports to ADs has increased in terms of both the share of exports to ADs in SSA export and the growth rate of exports. There are, however, issues of market access to ADs for SSA agricultural products. Competition in the domestic markets of SSA economies from agricultural imports from ADs may also have implications for SSA agricultural development.

The paper raises the following research questions. What are the modalities of aid from the two Asian giants to SSA agriculture? Is aid from them any different from that of other donors in SSA agriculture? In what ways have the ADs influenced SSA agriculture?

Some SSA countries have specifically signed agreements with ADs on agricultural development cooperation. The country case studies should investigate the various ways in which the ADs interact with SSA countries in agricultural development. What is their impact on SSA in agricultural trade? What is the composition and trend of agricultural trade between the ADs and SSA? To what extent do SSA countries negotiate with the ADs on market access? What agricultural products from China and India compete with SSA agricultural exports in third markets? To what extent are competing exports from the two countries displacing SSA agricultural exports? Are they dumping agricultural products in SSA countries? How competitive are agricultural imports from the ADs? The paper concludes by discussing selection of country case studies, fields of expertise and approaches to analysing the impact of the ADs on agriculture.

Oil and Gas

Ernest Bamou and Adeola Adenikinju tackle this subject in their paper, “Evaluating the Asian Drivers’ Impacts on Sub-Saharan Africa Oil and Gas industries: A Methodological Framework”. The purpose of the paper is to analyse the channels through which the rise of China and India affect the oil and gas sector in SSA. These channels will vary depending on whether the specific SSA country is an oil exporter or an oil importer. The paper investigates these various channels as well as their impact on the economic growth process, equity, governance and the environment in SSA. As in the trade liberalization literature, there are three ways of dealing with the assessment impacts: cross-section analysis (with/without approach), time-series analysis (before and after approach) or computable general equilibrium (CGE) modelling, which allows systematic evaluation of alternative scenarios.

Quite a number of issues, policy research questions and concerns are country-specific. The multi-country study will be more useful to Africa if it covers both oil and gas producing countries as well as a number of oil and gas importing countries in SSA, and includes important emerging oil and gas producer countries. Moreover, the oil and gas producers in the subcontinent must improve the management of commodity related revenues and upgrading domestic infrastructure to reduce extant transaction costs. The paper then suggests the inclusion of the following producer and emerging producer countries: Nigeria, Sudan, Angola, Congo Republic, Equatorial Guinea and Cameroon, and the following importing countries: Ghana, Cote d’Ivoire, Kenya, South Africa, Zimbabwe and Zambia.

Metals, Ores and Minerals

A range of issues and challenges for further research emerge as businesses, governments and civil society groups in SSA mineral producing countries come to grips with the opportunities for economic development afforded by tight commodity markets while adjusting to the role of China and India as both major markets for minerals as well as sources of direct investment. Risks of distorted growth patterns over reliance on export receipts from mineral sales are simultaneously part of the challenge facing SSA mineral producers.

These and other issues are the concern of Richard Goode and Nehru Pillay in their paper on “The Impact of China and India on sub-Saharan African Metals, Ores and Minerals: Issues and Challenges”. From an examination of the minerals trade between the SSA and the ADs, several key issues call for further detailed investigation and analysis: First, developing an information base particularly distinguishing the ADs’ share of world mineral demand should be an important preliminary step to understanding the challenges and opportunities for SSA. Further, tracking outward investment by Chinese and Indian enterprises into SSA countries mineral sectors is an important task for the observation of the impacts of the direct relationships. Second, under policy research, the paper recommends that focus be on the macroeconomic impacts of the rapid expansion of the resources sector, SSA mineral producers’ terms of trade with major trading blocks and value-addition in minerals-based development.

Several criteria are presented to guide the selection of countries for the case studies: Scope: Oil and petroleum are excluded, while energy minerals, ores, slag, ash, concentrates, metals, alloys and second stage dimension products are included; Scale: Each country is a significant supplier to China and/ or India with respect to the share of mineral trade in own country exports and of top exports of African products to Asia; and Data: Case study selection favours those countries that have good data sets available. The five countries suggested as meeting these criteria are Congo Brazaville, Ghana, Madagascar, South Africa and Zambia.

Manufacturing

Two papers investigate the influence of the Asian Drivers on Africa’s manufacturing sectors. In the first, Alemayehu Geda assesses “The Impact of China and India on Africa: Trade, FDI and the African Manufacturing Sector” through the lens of trade and FDI. The paper explores the methods used in similar studies and points out the relevant ones for the African study. In this context, an attempt was made to examine the impact of the ADs on the manufacturing sectors of African economies. First, China and India’s growth is creating a demand surge for African commodities. Second, it seems that some policy makers are worried about the detrimental impact of the Asian Drivers on their country. Finally, the distributional implications of trade with China and India are also worth examining.

Towards that end, the author suggests using a case study approach to carry out an in-depth study of the impact of the ADs on Africa. Once this information is put together, an attempt would be made to see the place of the African countries identified as case study countries in the hierarchy of manufacture exporters of China and India in the context of the "Flying Geese" Model. This framework will help in examining the competitive or complementary (as well as direct and indirect) impact of the Asian Drivers on African countries.

Dorothy McCormick, in "China, India, and African Manufacturing", attempts to analyse two variables that are not regularly considered when discussing the impact of China and India on African manufacturing: Aid and migration. The two are among the channels through which China and India affect African manufacturing and, through manufacturing, development outcomes. Both aid and migration are complex phenomena with the potential to affect manufacturing directly and indirectly. Empirical research on the impact of aid and migration is much less advanced than research on the impacts of trade and FDI.

Two sets of research questions flow from the analysis in the paper. The first deals with the impact of foreign aid, specifically aid from China and India, on manufacturing in SSA. The second deals with the impact of the movement of people between Africa and China and/or India. That notwithstanding, a third set of resource questions could be identified. These would explore the interactions between aid and human resource flows, as well as between these variables and other variables affecting manufacturing, especially trade and foreign direct investment.

The paper postulates that methodologies must take into account both data needs and data availability. The latter will vary considerably from country to country, as well as between aid and migration information. While country-level policy information may be available, good secondary data on policy analysis, policy change processes, impact of aid and migration on manufacturing, and so on may not be available.

Infrastructure

In Africa, infrastructure development is considered to be one of the core weaknesses constraining the continent's sustainable development prospects. The emergence of the Asian Drivers, notably China and India has become particularly relevant in this regard for providing the impetus towards strengthening Africa's infrastructure requirements. The paper by M. Davies, S. Naidu and I. Mwanawina on "The Impact of China and India on SSA Infrastructure Development: Issues and Challenges" provides a framework for outlining these issues. The provision of infrastructure aims to reduce capacity constraints in order to achieve operational goals and technological transfers aimed at developing the country's capacity in the longer term. The main purpose of this analysis is to identify, map and analyse the impact of Chinese and Indian investment in SSA's construction sector.

On research questions the paper focused on the push-pull factors influencing the Asian Drivers' infrastructure investment strategy in SSA and the means of encouraging AD investors from a policy perspective to engage in local capacity building and technology transfer. While the outcomes of the project research will be multi-dimensional, the paper nevertheless provides a framework to test empirically how the ADs are changing, positively or negatively, the infrastructural landscape of the SSA, particularly in terms of socioeconomic growth, distribution and governance, and the implications for poverty reduction and achievement of the Millennium Developmengt Goals.

The paper suggests the criteria for selecting countries to be included in the case studies could be based on the availability of data on Chinese and Indian firms; the accessibility of the countries selected for study; and the means for drawing a reasonable comparison between Chinese and Indian firms.

Politics and Governance

Melvin Ayogu's paper on "The Impact of China and India on Politics and Governance in SSA: Issues and Challenges" is one of two framework papers in this area. He highlights the salient political and governance issues for researchers tasked with fleshing out or predicting the various implications of Asian Driver activity for African countries. This choice is based on the premise that the most significant aspect of the influence of ADs on politics and governance is in their impact on policy processes. In this framework, policies emerge out of a process initiating from policy preferences to methods of aggregation of those preferences and hence to policy choices as mediated by the structure of political competition. Whereas policy choices are mediated through domestic political institutions, policy outcomes depend very much on the character of the bureaucracy – in addition to other factors. Hence the ADs' influence on the design of institutions or institution-building is another aspect of the domestic environment that is implicated in this analysis.

Several issues arise from this framework for examining the impact of Asian Drivers on politics and governance. First, the principal political-governance question is whether or not the increased interaction with China and India induce governments to become more or less responsive or accountable to the electorate or "selectorate?" Second, is the question whether the presence of AD in the region is correlated with the emergence or decline of political expression such as voting, lobbying, and/or violence? Could this be facilitated through supplying ordinance technology and/or ideology? Finally, what are the potentially critical parameters for influencing or altering the structure of political competition? The challenges are to predict those crucial influences on politics and governance and then either formulate enabling measures or construct defences and countermeasures as the case may be and in the process undertake the calculus of benefits and costs implied by each policy option. Further issues discussed range from national to regional dimension.

This paper finds the criteria for country selection superfluous since ADs are already ubiquitous in the region. However, it points out that ADs have strong presence in Namibia, Zambia, Zimbabwe, Kenya, Tanzania, Nigeria; Cameroon qualifies independently because of energy. So do Gabon, Equatorial Guinea, Angola, Chad, Sudan, and DRC. Others include South Africa, Botswana, Mozambique, Rwanda, Ghana, Ethiopia, Eritrea, Uganda, Sierra Leone, and Uganda.

Next, Elizabeth Sidiropoulos considers governance specifically in her paper, "The Impact of the Asian Drivers on Governance in Africa". She points out that the question of the role of governance on the ability of African states to address their developmental weaknesses has risen in prominence within the continent in the last decade or so. African states' history of weak institutions, authoritarianism, inadequate human and capital resources, have all conspired to make Africa the most marginalized and poor continent. At the outset, it is important to note that the investigation of the impact of the Asian Drivers on governance in Africa is a cross-cutting issue, which must inform all field research conducted on the sectors (agriculture, oil and gas, infrastructure, manufacturing).

This impact should be examined at four different levels: the level of political institutions and processes; the level of economic and fiscal management; the local community level; and the level of firms. How are such policy choices made at the state level? Are the Asian Drivers concentrating their political engagement only at the state level, or is it more diversified? How do these engagements differ between India and China? Do the ADs help political elites within African states to withstand pressures to improve governance from Northern donors and equally from domestic constituents?

On policy implications for different actors China's entry into some of the more fragile states seems to boost state/regime security at the expense of people security. How the Asian Drivers themselves evolve as they begin to assume greater global roles and responsibilities, and how their own domestic political and economic system change will affect in no small measure their interaction with African states.

The criteria for potential country case studies should ensure a good spread in terms of the typology of state: Fragile, 'captured', contested, criminal? Authoritarian or semi-authoritarian? Democratic aspirants? Democratic consolidators? In addition, the paper argues for a fair mix between resource rich and resource poor states. Equally the selection should look to the relevance of the country studies to governance and the potential overlap with the economic sectors being investigated.

Country Case Studies

The initial stage of the country case studies will focus primarily on China, given the higher intensity and magnitude of its interactions with SSA countries when compared to India. It is envisaged that the lessons learned in the process will provide useful guidance to the conduct of similar studies on the impact of India and other emerging economies of the South that should assist in designing Africa's strategic partnerships.

The primary purpose of the country case studies is to examine the range of issues and research questions in the context of several key sectors in a number of countries and across time. The systematic framework to be used for a coherent and overall evaluation of the impact of China on each of the selected SSA country case studies is adapted from the framework papers outlined above as well as Humphrey and Schmitz (2006) and Kaplinsky et al. (2006). This framework starts with the identification of the key channels through which the impacts of China may be transmitted to an SSA economy: trade, investment and aid flows.

In the context of each of these channels, the nature of the relationship between an SSA country and China may be *complementary* or *competitive*, or even both. It may also give rise to both *direct* and *indirect* impacts. In the case of direct impacts, both complementary and competitive dimensions of impact result from bilateral relations between the two parties. Thus, direct impacts arise from bilateral trade, investment and aid flows between a particular African country and China. By comparison, indirect complementary and competitive impacts derive from one party's relations with third parties that also affect the other party indirectly. The impact may also be *transitory* or *permanent*.

Indirect effects include, for example, China's impact in increasing commodity prices that has favourable effects on African producers (barring Dutch disease effects) but may adversely affect consumer countries (e.g., a global increase in the price of oil). Another indirect effect is the threat of China's exports crowding out SSA exports in third-country markets. China's export share in the world expanded from 1.6% in 1987 to 7.2% in 2005 (while that of India has remained at 0.95%), while world manufacturing export prices have declined substantially in the last two decades, partly due to the impact of these Asian drivers (Kaplinsky et al.2006).

These impacts will be evaluated in terms of *four* selected policy areas: economic growth and diversification; income distribution; environment; and governance. The country case studies will be used as a means of isolating country-specific impacts and measuring cross-country differences. Within each country, however, variations as well as sectoral differences in impacts can also be important. Hence, five sectors have been selected for specific focus: agriculture; oil and gas; solid minerals; manufacturing; and infrastructure

There is limited published information on the size, structure and significance of China's relations with SSA countries upon which a selection of countries to be included in the in-depth studies can be based. To fill this gap, AERC recently commissioned small-scale scoping studies to provide a reliable basis for disciplined selection of countries where specific in-depth case studies should be conducted. On the basis of available data on Chinese trade, investment and aid relations with the SSA countries, the following 28 countries were selected: Angola, Benin, Cameroon, Chad, Congo, Côte d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Ghana, Gambia, Guinea, Guinea Bissau, Kenya, Liberia, Madagascar, Mali, Mauritania, Mauritius, Mozambique, Namibia, Nigeria, S. Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe. These accounted for at least 1% of total Chinese imports, exports, aid and/or FDI.

Upon completion of the scoping studies, a workshop to review the reports will be organized. The candidates for in-depth country case studies will then be selected and the studies commissioned. The number of in-depth case studies will be determined ultimately by the resource profile, but at least 15 studies are envisaged. There will be one each analysing the impact of trade, investment and aid on agriculture, manufacturing, oil and gas, solid minerals and infrastructure.

The pending work programme is expected to culminate with the publication of the country case study reports in early 2009.

Related Networking Activities

A planning meeting held in July 2006 in Nairobi (Kenya) discussed the research issues, scope and contents of the framework papers. In September 2006, AERC was invited to participate in a meeting of the Africa Union (AU) Task Force on Strategic Partnerships Between Africa and the Emerging Countries of the South in Addis Ababa (Ethiopia) at which some of the issues identified in July were presented and discussed.

Subsequently, a review workshop on the draft framework papers was held in Addis Ababa in October in collaboration with UNECA. Participants at this workshop included researchers, policy makers (from ten African countries), and representatives of the African Union, African Development Bank (AfDB) and development partners including the Department for International Development (DFID) of UK, the International Development Research Centre (IDRC) of Canada and the Rockefeller Foundation. Shortly after the Addis Ababa workshop, AERC was invited to make a presentation on the same issue at a joint workshop convened by the New Partnership for Africa's Development (NEPAD) and the South African Institute of International Affairs to provide input into the preparation for the Forum on African-China Cooperation (FOCAC) in November 2006. AERC also made a presentation on the impact of China and India on SSA at the Conference of AU Ministers of Finance in Yaoundé (Cameroon) in November.

A second review workshop on the revised framework papers was held in Mombasa (Kenya) in February 2007. Again, participants included senior policy makers and researchers (from 20 African countries). A distinguishing feature of the Mombasa workshop was the participation of senior researchers from China and India who made presentations on the impact of their countries on SSA from the perspectives of policy makers in China and India. Senior researchers from South Korea and Thailand also made presentations on the impact of China and India on South Asia and the Mekong Region, respectively.

The framework papers and the contributions of participants from China, India, South Korea and Thailand will be published shortly.

Following the Mombasa meeting, AERC was invited to make presentations at different forums on the AD project. In February, AERC participated in the ICTSD/AERC Strategic Dialogue on Research Agenda for Africa on Trade as an Instrument for Sustainable Development, in Geneva (Switzerland). And in March AERC presented information and preliminary results of this research project at the Meeting of EU Official Commercial and Economic Counsellors in Kenya. Other presentations so far this year include: EU in Brussels (March); Ministry of Foreign Affairs and NORAD, Oslo (March), the Swedish Business Community in East Africa (April), and the Chinese Academy for Social Studies in Beijing (September). There is thus a clear indication that the project has already attracted considerable attention of African policy makers, researchers and Africa's development partners, including China and India.

***Francis Mwega** is an Associate Professor of Economics at the University of Nairobi, Kenya. ■

References

Humphrey, J. and H. Schmitz. 2006. "The impact of China on Asia". Mimeo. Institute of Development Studies, University of Sussex, Brighton, UK.

Kaplinsky, R., D. McCormick and M. Morris. 2006. "The impact of China on Sub-Saharan Africa". Mimeo. DFID China Office, Beijing.

Reproductive Health, Economic Growth and Poverty Reduction

By Germano Mwabu*

With the financial support of the William and Flora Hewlett Foundation, AERC launched its collaborative research project on *Reproductive Health, Economic Growth and Poverty Reduction in Africa* in 2006 by commissioning framework papers. The framework papers were presented at a workshop in Kampala, Uganda, on 15–16 March 2007 in a discussion featuring researchers and policy makers drawn from all the major regions of sub-Saharan Africa. It is a policy-oriented research project with a strong capacity building component.

Why Study Reproductive Health?
The purpose of the project is to investigate theoretically and through country case studies the nexus between population dynamics, reproductive health, economic growth and poverty. Previous poverty research in Africa analysed the state of deprivation in the continent without explicitly considering population dynamics. As a result, the role played by reproductive health in economic growth and poverty reduction was not analysed. In particular, the opportunity to analyse investments that attack the root cause of poverty was missed. Across much of sub-Saharan Africa the root cause of poverty is the poor health of mothers and children. The poor health of mothers and children affects agricultural production and therefore economic growth and consumption through several channels. In an agrarian setting, such as prevails in sub-Saharan Africa, physical effort is a critical factor of production and rural African women of reproductive age are the main source of labour for agricultural production. However, because a significant portion of this labour is lost through high maternal mortality, while the remainder is burdened by common illnesses and a lack of antenatal and postnatal care, the contribution of reproductive-age women to agricultural production is far below its potential.

Moreover, the health of children, which begins in utero even among high-income households, has an even greater adverse effect on future growth and consumption. Poor child health interferes with schooling, retarding the accumulation of educated human capital, and this reduces productivity of future adult labour. It is also known that deprivation of nutrients in utero and early childhood affects the cognitive and physical development of children, putting them at risk of premature death, chronic illness, and low capacity to innovate and invent. These medical conditions and risks, many with origins in utero and many that cannot be outgrown or overcome in later life, necessitate expenditure of resources.

In low-income countries resource allocation choices must be made among investments that increase production, such as research and development, construction of physical infrastructure, and control of parasitic diseases. It is unfortunate that women's and children's health is too often not considered as part of the investment in production. Thus, the poor health of women and children can trap an economy into a vicious, intergenerational circle of poverty, where low-investments in reproductive health lead to low labour productivity and hence to inadequate levels of income. Moreover, because available incomes are insufficient to finance adequate levels of health care, the general health of the population at all ages is impoverished.

> The root cause of poverty in much of sub-Saharan Africa is the poor health of mothers and children.

This collaborative research project will provide information that policy makers in sub-Saharan Africa can use to implement policies to improve reproductive health. Under certain institutional and market environments, investments in reproductive health can stimulate economic growth, reduce poverty and improve the general health of the population. The key features of the environments under which reproductive health would improve living conditions of the population include availability of remunerative employment, elastic demands for agricultural and industrial products, a culture of innovation and technology adoption, and macroeconomic and political frameworks that provide incentives for high rates of utilization of labour and capital. In the absence of good policies and a conducive business environment, health improvements may not lead to better standards of living, and could instead be eroded by social conflicts, idleness and crime. Moreover, increased production of industrial and agricultural products resulting from better health capital can be short-lived if markets for these products do not exist, a situation that could plunge a country into poverty after a spell of high incomes. Thus, as some of the framework papers emphasize, dividends from reproductive health investments are not automatic.

Overview of Framework Papers
The framework papers presented at the Kampala meeting in March 2007 will guide researchers in the preparation of country case studies. They contain concepts and methods for investigating the nexus between reproductive health, economic growth and poverty reduction. The papers cover demography, mortality, income distribution, poverty, and organization and financing of reproductive health services. A summary of all these papers is beyond the scope of this research note. Nonetheless, some highlights of some of the papers are presented, with a focus on policy messages.

Poverty, Growth, HIV/AIDS and Reproductive Health
The importance of maternal health for a country's social and economic development is underlined in a paper on the relationships between poverty, and maternal morbidity and mortality. Good maternal health is fundamentally important for a country's wellbeing and prosperity. Mothers' health during reproduction is critical to their families, their communities, and the entire process of economic and social development. This issue is worthy of investigation given the magnitude of the problem of poor maternal health in sub-Saharan Africa, and the difficulty of reducing the maternal mortality ratio in the continent.

The problem is compounded by a lack of reliable statistics on health status of women in Africa. Emphasis needs to be placed on improving the availability of reported maternal health statistics in order to facilitate assessment of progress made in this key area of national development. The paper further points out the strong link between poverty and maternal morbidity, which is particularly acute in rural areas where reproductive and related health services are inaccessible by the majority of women. Poverty affects maternal health through its effects in a number of areas: access to medical care, water and sanitation; intake of food nutrients; leisure consumption; and the type of the environment one is exposed to. The relationship between poverty and reproductive health has implications for labour market outcomes, as well as for home production activities. The understanding of this relationship is particularly important for design of policies aimed at addressing human capital formation. Key to the success of such policies is their effectiveness in reducing maternal morbidity and mortality.

The high risks and vulnerabilities faced by African households are analysed in another paper. It is argued that in order to implement interventions that are effective in reducing poverty and improving reproductive health, it is necessary to understand how the various shocks are transmitted to households and how they affect their resource allocation decisions. Moreover, the ability to identify household members who are vulnerable, and how their vulnerability affects the welfare of other household members, is critically important in the design of effective interventions. An important policy message emanating from this and several other framework papers is that new employment opportunities for women can reduce fertility while induced reductions in fertility can increase women's employment, which can both lead to demographic transition, to the realization of demographic dividends and to poverty reduction.

The role of behaviour in the linkages among reproductive health, HIV/AIDS and poverty is the focus of one of the papers. The bulk of interventions designed to confront HIV/AIDS and many other reproductive health problems is rooted in behavioural fundamentals, such as safer sex practices, adoption of family planning, utilization of antenatal care, and use of voluntary counselling and testing services. A recurrent policy question is how to design such interventions to provide incentives that lead to desired behaviour change. The economic frameworks presented in some of the papers can guide policy in this area. The HIV-positive status is linked to the constraints imposed by poverty, the lack of reproductive health services and unsafe sexual behaviours. Interventions that target access to reproductive health services and change in sexual behaviour are key to controlling the HIV/AIDS epidemics in Africa, which have reached alarming proportions in some countries.

In some African countries, HIV-positive status tends to be associated with greater wealth. This raises the policy question of who should be targeted by an HIV prevention programme. In particular, this evidence raises the equity question as to whether public subsidies in Africa should be targeted to wealthier members of society through HIV-prevention programmes rather than to poor households who need the subsidies to smooth consumption.

There was intense discussion at the Kampala conference on feedback mechanisms from HIV/AIDS to poverty and vice-versa. There was consensus that HIV/AIDS leads to poverty through reduced labour supply and incomes, as well as through increased health expenditure on medical care.

Moreover, the resulting income and labour shortages and the associated social stress within the household lead to lower investments in the schooling of children, creating the risk of intergenerational transmission of poverty, as well as the risk of exposing the same household to HIV infection in the future.

A paper on population dynamics and demographic transitions emphasizes the conditions necessary for a country to realize demographic dividends. It argues that the right institutional environment is critically important for sustained economic growth to occur following a demographic transition. The key policy question is how the institutions necessary to realize demographic dividends can be initiated and fostered in Africa.

The capacity to benefit from demographic transition depends on well-designed policies and high quality institutions and social infrastructure, and the opportunities and challenges presented by each stage of the transition require specific policy actions. For example, the right policies are needed to speed up the mortality transition, and to educate and care for the health of the baby boom generation in its early years. Also needed are labour policies that facilitate employment for the resultant large adult cohorts, as well as policies that encourage and efficiently allocate savings for development. The policy framework needed for realizing the potential benefits of demographic transition include labour market policies to increase job opportunities for the increasing workforce, social security to provide for old age, and policies that facilitate the linkage of school curriculums with labour markets.

This paper stresses the importance of institutional quality in realizing the growth effects of demographic transitions. Thus, while the effect of demographic change on economic growth is likely to be high, the existence of good institutions is key to realizing this growth. Countries therefore need to invest in macroeconomic and institutional environments that are conducive to growth. The paper concludes with the observation that economic growth in sub-Saharan Africa is governed by the same principles that determine growth in the rest of the world. As such, Africa has the potential to capture and benefit from the demographic transitions that have benefited countries in other parts of the world.

Financing and Provision of Reproductive Health Services

The paper on reproductive health accounts in Africa raised the important point that policy makers, especially in Africa, still lack critical information about current national spending on reproductive health care. The relevant financing issues here include the amounts spent on reproductive health services, the sources of the funds spent, resource flow patterns across sectors and the linkage of expenditures link to reproductive health outcomes. Related financing issues concern the accessibility and quality of reproductive health services and their impacts on vulnerable groups such as the youth, the elderly, women and children.

Issues of policy concern in the provision and organization of reproductive health services are also treated in one of the framework papers. It is argued in the paper that systems of service provision can promote or hinder the utilization of reproductive health services. The key provision and organizational design issues include the quality of care, comprehensiveness and linkages of the services provided, effectiveness and efficiency in resource use, and the organizational autonomy of service providers. Designing mechanisms for coordinating the provision and financing of the various components of reproductive health services is a key policy challenge facing health policy makers in Africa.

Conclusion

Several key policy messages can be gleaned from the framework papers presented in Kampala. Among these are:

- Large demographic dividends can be gained from demographic transitions, in terms of a permanent increase in economic growth rate, a substantial reduction in poverty and a significant lengthening in life expectancy.
- The demographic transitions and the associated dividends are not automatic. The demographic transitions arise from deliberate investments in reproductive health, which in turn leads to sustained reductions in mortality and fertility rates, generating a workforce unencumbered by dependency burdens and risks of premature death. In order for this workforce to acquire useful skills and be productive, however, it must operate in a right environment. The right environment is one that has the necessary *institutions and infrastructure* to facilitate the development and proper functioning of labour markets, ensure smooth interactions among individuals, firms and social groups, and induce foreign investment.
- The necessary condition for improving reproductive health is broad-based provision and financing of services that are needed to enhance reproductive

health services such as family planning, antenatal and postnatal care, and immunizations. For these services to improve health they need to be used by the relevant population groups. Family income and its distribution within the household, access to services, and the cost and quality of services are some of the determinants of service utilization, and policy should be directed at influencing them.

- Information is lacking in Africa on the sources of funds for reproductive health services and needs to be collected on a systematic basis. Moreover, few countries on the continent have developed or implemented policies for financing reproductive health care, a situation that needs to be rectified.
- The HIV/AIDS pandemic continues to be a major problem in Africa and has immense deleterious effects on reproductive health. Behaviour change interventions, such as safer sex practices and voluntary counselling and testing, combined with broad-based provision of anti-retroviral treatments, including the support and care of the persons living with HIV/AIDS need to be implemented to control the epidemic. Further, new labour markets and credit reforms need to be implemented to reduce poverty among such persons.
- Policies that promote stable macroeconomic management, good governance and political institutions are needed to support micro level efforts to improve reproductive health, increase growth and reduce poverty.

***Germano Mwabu** is a Professor of Economics, specializing in health issues, at the University of Nairobi, Kenya.

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Collaborative Research

Project on Institutions and Service Delivery in Africa

*By Mwangi S. Kimenyi**

An important dimension of enhancing the wellbeing of Africans concerns improving delivery of services. But as in many other places in the developing world, African countries are replete with cases of poor service delivery to the majority of the population and especially to the poor. Poor delivery of services implies that many of the intended beneficiaries do not have access to the services or they may receive dismally low quality services and in insufficient quantities.

Examples are legion: health clinics with no drugs or qualified health providers; schools where teachers miss classes or even go to school while intoxicated; police who refuse to provide services until after bribes are produced; inadequate provision of security of person and property and widespread mistreatment of clients by providers. It is commonplace that many urban residents in Africa must deal with infrequent garbage collection, unreliable water and power supplies, and generally poor provision of security. Farmers do not see agricultural extension workers for months or even years and in many cases do not come into contact with service providers at all.

Likewise, services may not be available in a timely manner or the services so provided may not reflect local needs and conditions. This means that consumer preferences are not taken into account when deciding on the types of services or the mode of provision. Because of poor service delivery, the quality of life for many people remains low and has even at times deteriorated. Improving quality of life for the majority of the population therefore necessarily requires improvements in the quality of provision of services (Kimenyi, 2005).

Resources Are Not the Only Bottleneck to Service Delivery

To some extent, the quality of service delivery is dependent on resource constraints – both financial and human. Provision of services requires tangible financial resources and, given that many developing countries face severe resource constraints, quality of provision is likely to be poorer in these countries relative to more economically advanced countries. This is because the technology of delivery and the quality of service infrastructure are likely to vary across countries with different levels of income. Likewise, the human resource in terms of know-how and organizational capacity is an important determinant of service delivery. Qualified personnel to manage service delivery are crucial for quality provision. To the extent that these resources are relatively scarce in poor countries, then service delivery can also be expected to be considerably poorer. In other words, the state capacity to deliver services does influence the quality of service outcomes.

But resources are only one of the important performance factors that affect the quality of service provision. In fact, evidence seems to suggest that in many developing countries, there is only a weak relationship between government expenditures on social services and the level of service delivery (Collier, 2007). Recent evidence shows that even when resources are allocated for provision of services, a large proportion of the resources might not reach the intended clients. Thus, service delivery is characterized by widespread resource leakages (Gauthier and Reinikka, 2007). In other cases, services may not be provided because frontline providers do not show up to work, which translates into poor delivery of services.

> Resources are but one of the important performance factors that affect the quality of service provision.

The implication is that the availability of resources does not guarantee that intended beneficiaries do in fact receive benefits that would be expected from the resources allocated. This explains the often observed result of the weak relationship between, for example, health expenditures and health outcomes in developing countries. In fact, there are cases for which increased expenditures on social services have been associated with decreases in indicators of wellbeing. Such outcomes reflect weaknesses in the internal efficiency of the delivery mechanisms. Simply, budgetary allocation for a particular service may be only weakly related to what is delivered to clients.

Institutions Are Equally Important

Clearly, then, while both human and financial resources are crucial determinants of service delivery, availability of resources does not guarantee efficient delivery of services. Thus, even though aid may be made available to developing countries for the provision of services such as education and health, there is no guarantee that such resources result in the intended outcomes. What seems to be an important determinant of the quality of service delivery are institutional arrangements and specifically the degree to which they affect incentives, provider behaviour and accountability.

The quality of the institutions for service delivery can therefore be evaluated primarily on the degree to which they promote accountability within the service delivery chain and therefore, other things equal, the quality of provision can be expected to vary across institutions. Thus, citizens of different societies that otherwise are similar in terms of resource endowments could enjoy different quality of services due to differences in the quality of the respective institutions. This could also be true for different services in the same country if there are differences in accountability relationships across the delivery chains of the services.

In short, the quality of provision is directly related to the quality of institutions. In developing countries, weak institutions compound the problem of service delivery and hence further undermine the prospects of improving the quality of life. Poor service delivery can be expected to have a greater negative impact on the poor, who generally lack alternatives and may not have access to information about what quality of services to expect. In essence, reforms that target improving the quality of service delivery must necessarily focus on reforming institutions for service delivery.

AERC Project Explores Service Delivery Links

The collaborative project on Institutions and Service Delivery seeks to investigate the link between institutions and service delivery outcomes. The project involves an in-depth investigation of service delivery experiences in Africa with a view to unearthing how institutional arrangements affect the quality of provision by focusing on accountability relationships across service delivery chains.

Beyond the normal capacity building in research, which is in itself important and the core business of the Consortium, this project has a direct bearing on the main development objectives guiding policy in Africa. It is therefore expected that the results of the project will support the enactment of informed policy by African governments in support of a range of policy initiatives. Key among these are the policy goals outlined in country-level poverty reduction strategy papers (PRSPs), the global Millennium Development Goals (MDGs), and the New Partnership for Africa's Development (NEPAD). While each of these initiatives emphasizes a specific policy focus, their common theme is improving the quality of life for all Africans, particularly the poorest members of the population.

To achieve the stated goals, proposals embodied in all the initiatives are in agreement on the importance of improving service delivery. NEPAD, for example, emphasizes the need to bridge the infrastructural gap and investing in all infrastructure sectors including alternative delivery systems such as increasing the role of the private sector. NEPAD also focuses on human development and places an emphasis on education and health. The PRSPs and MDGs focus on improving the wellbeing of the poor and raising their capabilities, which require more efficient delivery of development goods. By and large, meeting the MDGs such as those related to education, poverty and heath necessarily require improvements in service delivery. Thus, this project is expected to contribute directly to policy and to the achievement of the development targets that African countries have set for themselves.

Institutions and Service Delivery: Theory and Evidence

Public service delivery is characterized by the problem of agency, which arises from the fact that clients, politicians and frontline providers have divergent interests. In an excellent report, the World Bank (2004) presents a conceptual framework of service delivery that focuses on accountability relationships between principals and agents in the service delivery chain.

A number of the framework papers of the AERC project provide theoretical insights into the principal-agent nexus as it relates to service delivery (Gauthier and Reinikka, 2007; Collier, 2007; Kimenyi and Shughart, 2007). On the one hand, the service delivery framework shows the relationship between clients (citizens) and policy makers, as well as between clients and service providers. Both of these relationships focus on the ability of clients to hold the policy makers and the service providers accountable.

The other aspect of the principal-agent framework relates to the relationship between the policy makers and the service providers. These networks of principal-agent relationships associate with numerous incentive problems that affect service delivery. Institutions influence the quality of service delivery by reducing the incentive problems and imposing constraints on decision makers. Effectiveness of service delivery therefore largely depends on how well institutional arrangements affect accountability across the service delivery chain. AERC's project extends this framework by looking more specifically at various institutional arrangements in Africa that influence accountability in service delivery.

The other broad aspect of service delivery covered by the framework papers is on the methodological approaches to evaluating quality of service delivery. Kimenyi, Ray and Chen (2007) review some of the empirical approaches to evaluating public services such as education and health. The authors discuss approaches such as stochastic frontier analysis and also data envelope analysis. Gauthier and Reinikka (2007) provide insightful and detailed discussion of specific methodologies of evaluating services such as the public expenditure surveys (PETs), quantitative service delivery surveys (QSDSs) and citizen report card surveys (CRCSs).

Following the accountability framework, the framework papers for the project discuss how various institutional arrangements affect the principal-agent relationships and thus the efficiency of service delivery. Some of the key institutions discussed are both fiscal and political decentralization, availability of alternative providers, and political institutions such as democracy and electoral systems (Collier, 2007; Wantechekon and Weltman, 2007; Dessy, 2007; Kimenyi and Shughart, 2007).

Dessy et al. (2007) also look at experiences with service delivery reforms in Africa. The evidence from this and other studies reveals that institutional arrangements can have a major impact on service delivery outcomes if they are effective in increasing client power and also constraining government. Nevertheless, the studies reveal that there are many unanswered questions about the effectiveness of institutions in enhancing accountability and thus the need for specific country case studies to evaluate under what conditions different institutional arrangements impact on accountability in service delivery.

In his framework paper, Wangwe (2007) discusses the interaction of foreign aid and accountability in service delivery within the African context. As already observed, resources are an important determinant of the quality of service delivery. As such, foreign aid is an important aspect of service delivery in Africa given the resource constraints. Nevertheless, resources from donors can have a positive impact on service delivery only if associated with improvements in accountability. Wangwe provides a detailed review of the literature on the impact of aid and specifically the role of donors in influencing institutional changes that affect accountability. Of particular relevance is his thoughtful discussion of accountability systems and the management of aid for service delivery.

One of the primary messages emanating from the framework papers is that delivery of basic services in Africa can be greatly enhanced without additional resources. Several of the papers review studies that have found extensive failure in service delivery. Some insightful evidence of the poor quality of service delivery is provided by public expenditure tracking surveys and quantitative service delivery surveys, as well as the citizen report card surveys. These methodologies have been found to be very useful in studying institutions and service delivery. Specifically, the approaches reveal how different institutional arrangements affect service delivery outcomes.

A particularly important aspect of African institutions that appears to influence service delivery is ethnicity. Ethnic diversity can influence service delivery negatively or positively depending on the nature of political institutions (Wantchekon and Weltman, 2007). Again, the role of ethnicity in service delivery is largely unresolved and provides a rich avenue for research.

Country Case Studies

The framework papers provide several suggestions for country case studies, which comprise the second phase of this project. Probably most important is using the accountability framework to evaluate service delivery. The papers provide a rich menu of possible issues and institutional arrangements with potential for serious impacts on service delivery. For example, country case studies could focus on political arrangements (decentralization, electoral systems), social institutions (ethnicity), client participation in service delivery, the role of alternative providers (mission hospitals, private clinics), and so on. Studies could also focus on the role of aid in service delivery with special focus on the impact on accountability relationships. Application of the various methodologies can reveal how institutions affect on service delivery and the appropriate reforms that could improve on the accountability relationships.

In addition to the various suggestions for research mentioned above, the framework papers offer several proposals for research. One of the common suggestions is to implement randomized experiments to investigate service delivery. Such experiments could provide a wide range of answers to questions concerning institutions and service delivery.

An important suggestion is the need to benchmark service delivery in Africa. This calls for a baseline survey to determine the current status of service delivery in Africa. This would, for example, involve benchmarking the extent of access to services, resource leakages, provider absenteeism, etc. Such a survey could be used to evaluate progress in service delivery within a country and also for comparisons across countries. It is hoped that benchmarking service delivery will result in a "service delivery index" much like the investment climate surveys.

***Mwangi S. Kimenyi** is a Professor of Economics at the University of Connecticut, USA.*

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References

Collier, Paul. 2007. "Accountability in the provision of social services: A framework for African research". Framework paper for the AERC Collaborative Research Project on Institutions and Service Delivery.

Dessy, Sylvain (2007), "Client power, citizen participation, institutions and services delivery: Theory and Evidence with special emphasis on Africa". Framework paper for the AERC Collaborative Project on Institutions and Service Delivery.

Dessy, Sylvain, Des Ventacachellum and Justine Nannyonjo. 2007. "Services delivery reforms in Africa: A review of the initiatives and outcomes". Framework paper for the AERC Collaborative Research Project on Institutions and Service Delivery.

Gauthier, Bernard and Ritva Reinikka. 2007. "Methodological approaches to the study of institutions and service delivery: A review of PETS, QSDS, CRCS". Framework paper for the AERC Collaborative Research Project on Institutions and Service Delivery.

Kimenyi, Mwangi S. 2005. "Institutions and Service Delivery". Concept note for the AERC Collaborative Research Project on Institutions and Service Delivery.

Kimenyi, Mwangi S., Subhash Ray and Lei Chen. 2007. "Tools and techniques for evaluating service delivery". Framework paper for the AERC Collaborative Research Project on Institutions and Service Delivery.

Kimenyi, Mwangi S. and William F. Shughart. 2007. "Provider competition, marketization and the quality of public service provision". Framework paper for the AERC Collaborative Research Project on Institutions and Service Delivery.

Wangwe, Samuel. 2007. "Foreign aid, accountability and service delivery in Africa". Framework paper for the AERC Collaborative Research Project on Institutions and Service Delivery.

Wantchekon, Leonard and Sarah Weltman. 2007. "Political Institutions and public service delivery: A survey of the literature". Framework paper for the AERC Collaborative Research Project on Institutions and Service Delivery.

World Development Report 2004:Making Service work for the poor people. The World Bank, Washington, D.C.

Evolution, Status, and the Impact of ICT on Economic Development and Transformation in Africa

By Samuel M. Wangwe*

The process of technological innovation since the late 20th century has been dominated by new technologies such as biotechnology, new materials and microelectronics, together with innovations in software development. The combination of advanced microelectronics and software development has led to systemic technologies that have come to form a pervasive cluster of information and communication technologies (ICTs).

ICTs pertain to the new science of collecting, storing, processing and transmitting information in which information, computing and telecommunications are converging. Three broad subsystems make up the ICT system: technology and infrastructure (comprising communication and data processing), institutions (comprising legal and economic institutions), and social structures and processes (these influence ICT usage and the inter-personal links that facilitate the transfer of information).

The Influence of ICTs is Pervasive

The new industrial and technological revolution facilitated by ICTs is bringing about a significant, fast and extensive transformation of society and economic activity resulting in a rapid transformation of the processes of production as well as the transmission of goods and services produced. ICT systems are pervading virtually all forms of human endeavour: work, education, leisure, communication, production, distribution and marketing, as well as the content of information networks. Together these play a major role in all aspects of national life: in politics, in economic life, in social and cultural development. ICT is transforming the lives of people, the way they do business, access information and services, communicate with each other. ICT provides entertainment and has benefits relating to human rights by supporting freedom of expression and the right to information.

There is hardly a branch of the economy that has not been influenced by ICTs, and their pervasive impact has affected virtually all aspects of productive activity in the economy. The nature and extent of ICT adoption has been explored quite extensively in recent research, although in Africa such work is still limited. In the case of Africa the nature and extent of adoption of ICTs has been addressed in a few research programmes (e.g., Research ICT Africa) supported by the International Development Research Centre (IDRC) and the African Technology Policy Studies Network. This information is useful in understanding the pervasiveness of ICTs and the extent and patterns of access. What has not been explored adequately to date is the impact of ICTs on economic development and transformation of the African economy. This project is aimed to contribute to filling this gap.

AERC Project Explores ICT's Economic Impact in Africa

The objective of this research project is to investigate the impact and implications of ICTs on economic development and transformation in Africa. Specifically study has two main research functions:

- Identifying the status of ICT access and adoption in production and growth generating activities and the extent to which this could lead to economic transformation in Africa.
- Exploring the extent and options and possibilities of using ICT to enhance economic development and transformation in Africa.

The design of the project recognizes that the world has undergone a revolution in terms of structural change and technological transformation and that development is largely determined and led by technological advances. However, Africa is still lagging behind in this modern world that is driven by technological advances led by ICTs. Increasingly, ICT plays an important role in determining levels of development and the quality and accessibility of services in our modern societies.

> The world has undergone an evolution in terms of structural change and technological transformation, and development is largely determined and led by technological advances.

The project is being implemented starting with the framework papers whose purpose is to guide researchers who will be participating in field research. Nine framework papers have been commissioned by AERC and are now being prepared for publication. This stage is followed by undertaking country case studies in selected African countries. It is expected that fieldwork will begin in January 2008 and be completed by June 2008. The final date for project completion is September 2008.

ICT Policy Issues

What is the status of ICT policy in Africa? This question is addressed by Prof. Alison Gillwald and Lishan Adam in their framework paper on "The Political Economy of ICT Policy Making in Africa: Historical Contexts of Regulatory Frameworks, Policy Performance, Research Questions and Methodological Issues". Among other things, they note that hundreds of new local and community radio stations are now operating, and satellite TV is widely available. The spread of the Internet in Africa is phenomenal, although still at a relatively low level.

The realization of the potential of ICT in Africa in most cases is hampered by inadequate and unreliable infrastructure and human resources. The framework papers have gone into further detail regarding specific aspects of ICT. Prof. Nimal Nissanke, for example, explored "Human Capital Development for Effective ICT in Africa".

ICT and Economic Transformation

ICT can contribute to income generation and poverty reduction, and can facilitate economic transformation in Africa. The use of ICT to enhance economic development and transformation in Africa will entail addressing the impact of ICT on changing the structure of the African economy (composition of agriculture, industry and services). ICT using sectors will be selected from the most likely users. The framework papers address users in agriculture: Julian May, Mimi Ndokweni and Joseph Karugia on "ICT and Agricultural Development", Dorothy McCormick and Joseph Onjala on "Methodology of Value Chain Analysis for ICT", and Prof. Banji Oyeyinka on "ICTs and Industrial Development". It is hoped that specific case studies will explore other potential users such as the financial sector, the trade sector and other services sectors to be selected after preliminary investigation has been carried out at country level.

One effect of the diffusion of ICT is the disruption of established economic relations as new possibilities are in reach. Changes in how the economy works will also have effects on employment, while provision of basic social services like health and education is being facilitated by ICT development in Africa.

Using or Producing ICT?

ICT *producing* activities are presently not significant in African countries and it is likely that ICT *using* activities will be dominant for some time. However, it is important to address both with a view to establishing their significance and draw policy implications on each of the two categories. Applications of ICT may also be categorized by type of user. These range from personal or household use, to use in business and use in government.

In the context of Africa, ICT hardware may be disaggregated into telecommunications equipment and computer hardware manufacture and assembly. The latter should cover manufacture and assembly of computers (branded or unbranded/ clones) and include clusters that are emerging in activities associated with repair of computers as has been shown in the framework paper by Prof. A.O. Bamiro. ICT producing software and service activities are addressed by Prof. Bamiro in a separate framework paper.

****Samuel Wangwe is a Professor of Economics and the founding director of Economic and Social Research Foundattion*** ■

Game Theory for Economic Researchers in Africa

*By Akin Iwayemi**

Game Theory (GT) is a methodological approach for systematically analysing and predicting the outcomes of decision making under strategic conditions. Having witnessed an intense flurry of activity in recent years, it is now firmly established as an invaluable tool for structuring a wide range of human activity in which the outcomes depend on interactive actions of two or more individuals or agents, groups, states, countries and regions. Undoubtedly, GT has radically transformed and enhanced economists' understanding of and thinking about the analysis of strategic interactions and interdependent choices among economic agents under market and non-market institutions.

GT and the related economics of information, which have not only revolutionized the discipline of economics, but have yielded – and continue to yield – important insights into important theoretical and empirical puzzles in economics, provide an invaluable guide to contentious policy issues. The value added to the body of economic knowledge is evident in the award of several Nobel prizes in Economics for research based directly or indirectly on game theory frameworks. Game theory tools are most useful in modelling and interpreting social behaviour that involves collective action, governance, trust, coordination and heterogeneity in a deeper way than previously possible. GT is becoming a tool of choice for policy analysis and design in many areas of economic management and public policy. Increasingly, insights from GT and the political economy literature are yielding a more robust analysis and prediction of socioeconomic problems and policies in developing countries.

Why Game Theory is Important for Sub-Saharan Africa

Development and other policy results in recent years strongly suggest that dealing effectively with the innumerable socioeconomic development challenges facing the sub-Saharan Africa region demand more creative tools than the conventional and dominant neoclassical wisdom possesses. Clearly, the complex and seemingly intractable nature of a number of Africa's development problems explains why designing effective strategies to improve the social and economic conditions is a very challenging exercise. The use of GT and information economics will help in meeting this challenge. Indeed, the advancement in economic theory associated with the game theory approach has expanded our horizon for diagnosing and designing more robust policy solutions to the social and economic problems relevant to sub-Saharan Africa.

Yet, most economic researchers in sub-Saharan Africa have little or no exposure to game theory. Two factors militate against the exposure of mainstream economists and policy makers in Africa to this progressively very important tool in the economist's toolkit – the mathematical nature of most of the presentations of GT in the literature and the steep learning curve in unstructured learning.

In fact, and to a large extent, the first serious and formal exposure of African economists to GT is the Microeconomic Theory course taken by students under the AERC Collaborative PhD Programme in Economics (CPP). Even in that respect, the course's 20 hours of GT can only whet the appetite of the students. To compound the problem further, the majority of economists in the region have had little formal exposure to GT because of the dearth of teachers skilled in GT.

AERC Technical Workshop on Game Theory

Against this background of poor accessibility of this analytical tool to most African economists and the fact that GT has become an invaluable tool for analysing and designing robust policy solutions to the economic and social problems of development, AERC recognized the desirability of convening a technical workshop on this topic. Held in Nairobi from 26 March to 6 April, the workshop encompassed presentations and lectures, work group sessions, individual projects, assignments and quizzes, and group discussions. Fourteen researchers, four of whom were women, from eight African countries took part. They included persons from countries such as the Democratic Republic of Congo, Niger and Togo that have had little prior representation in AERC activities.

The main objective of the workshop was to improve the capacity of African economists to formulate and analyse social and economic problems by familiarizing participants with a broad understanding of static and dynamic games under conditions of complete and incomplete information. The workshop's specific objectives were to:

- Equip participants with a good understanding of Game Theory
- Enhance and improve the capacity of participants to characterize and model economic and social problems more robustly based on Game Theory.
- Build and strengthen institutional capacity in game theory modelling among AERC network of researchers and lecturers.
- Identify and examine the main themes in Game Theory with

relevance to political economy issues.
- Illustrate how Game Theory can be applied to important economic and social issues and problems in sub-Saharan Africa.
- Initiate, promote and strengthen networking and interaction among researchers who have been trained in the use of Game Theory in African universities, research institutions and in both public and private sectors who are involved in policy formulation, analysis and implementation.

Rationale for the Workshop

The developments in economic theory associated with Game Theory have expanded our horizon concerning the analysis, design and implementation of robust policies to deal more effectively with social and economic problems. Among the major contemporary policy issues that Game Theory has illuminated, and of relevance to the African region, are the analysis of social institutions, collective action and trust, and the design of regulatory mechanisms and institutions. Coming into play is a wide range of issues, including auction and bidding, deregulation and competition policy, pricing, policy credibility and reputation, bilateral and multilateral economic transactions, and the role of institutions.

Against the background of poor accessibility of most African economists to this important analytical tool, AERC recognized three important reasons for mounting this workshop:
- To facilitate the exposure of its network of African economists to this indispensable tool for economic analysis and policy design by reducing the steep learning curve associated with unstructured learning of the tool. The multifaceted nature of the factors affecting social and economic behaviour and conditions in sub-Saharan Africa strongly suggests that professional economists in the region should be equipped with this powerful analytical tool.
- To provide methodological support especially for the recent expansion of AERC's Biannual Research Workshop topics to include political economy. In fact, a major beneficiary of the emerging advancement in economic theory associated with Game Theory is political economy. The exposure of AERC's network of researchers to Game Theory analysis will contribute to a deeper analysis of the numerous political economy issues in the region.
- The need to fortify and/or complement the skills of AERC network researchers and lecturers in econometrics and computable general equilibrium modelling with Game Theory, given that each has its own merits in policy analysis. Thus, the key justification for this workshop is the urgent need to begin to address decisively this major gap in the researcher's toolkit in sub-Saharan Africa.

Workshop Scope

The workshop focused on the central concepts in classical Game Theory. In so doing, it linked Game Theory to wider debates in economic theory, socioeconomic policy issues and social institutions. The scope of the course was such that it would help the participants gain a better understanding of the economic and social issues and social institutions using Game Theory tools. The applications emphasized political economy issues in line with the most recent AERC thematic research grouping. In addition, other applications spanning microeconomics, macroeconomics, development economics, environmental economics, industrial economics and international economics were also examined.

The workshop was organized along the following themes:
- Overview of Game Theory and economics
- Economics, rational choice and institutions
- Defining and modelling a game in strategic and extensive forms
- Static games with complete information
- Dynamic games with complete information
- Repeated games (finite and infinite)
- Static Bayesian games of incomplete information
- Dynamic games of incomplete information
- Signalling games
- Bargaining
- Auction theory and mechanism design
- Evolutionary game theory
- Applications in:
  - Political economy
  - Development economics
  - Environmental economics
  - Industrial economics
  - International economics

Specific applications included analysis of incentives in social institutions of importance to economic and social development in the region. It is proposed that a follow-up workshop is necessary to consolidate the gains of this workshop. A subsequent workshop would focus more on the frontiers of knowledge in Game Theory, but with emphasis on its African applications.

***Akin Iwayemi** is Professor of Economics University of Ibadan, Nigeria

Research Paper Number 168

Implications of Rainfall Shocks for Household Income and Consumption in Uganda

By John Bosco Asiimwe and Paul Mpuga

Because much of Uganda's agricultural production activities are rain-fed, changes in weather conditions have important implications for households' total agricultural production and wellbeing, as well as for national income. This study investigates the implications of rainfall shocks for household welfare, and the household response to these shocks. A basic model of household production is used to assess the impact of rainfall variability on farm income and consumption expenditure and the households' response of to such shocks. The study uses pooled cross sectional data of farm households from the Uganda National Household Surveys for 1992/93, 1999/00 and 2002/03, which provide a rich source of information on individual and household characteristics (size, age, sex, education, employment, etc.), household income, expenditure, and exposure to risk/ shocks.

Households face several types of shocks, including illness/injury, separation, and loss of employment or production assets. Overall, 37% of Uganda's households had in the previous year faced at least one form of shock, with the most common being illness/injury (64%), followed by loss of assets (24%). Unfortunately, mechanisms for coping with shocks are rather limited – over 50% of those who faced shocks received no help at all.

Rainfall shocks are found to have important implications for both income and consumption of households, with strong policy implications towards cushioning agricultural households. Higher than average rainfall in the first planting and first harvest seasons results in lower incomes and consumption. It is also noted that other factors such as ownership of land, education of the household head and household size are important in the determination of household welfare. Community characteristics such as access to electricity, markets and infrastructure in general play a very important role in the welfare of agricultural households.

Research Paper Number 167

Extent and Determinants of Child Labour in Uganda

By Tom Mwebaze

Despite the prevalence and the many dangers associated with child labour, the phenomenon has received the attention of researchers, academicians and policy makers only recently, and not until International Labour Organization (ILO) estimates showed a large and increasing number of working children worldwide. It is now recognized that in order to combat child labour effectively, policies should be grounded in an informed understanding of its causes, roles and implications. This study uses data from the 1992, 1999 and 2002 Uganda National Household Surveys to explore the extent, determinants and forms of child labour in a poor but growing economy. Of note here is that over this period Uganda introduced universal and compulsory primary education.

The study highlights the extent, characteristics and determinants of child labour in Uganda and their evolution over the decade. The theoretical framework is a standard household production model that analyses the allocation of time within the household. Using probit and tobit models, we estimate the determinants of child labour for the individual child worker. The results indicate that child labour is still common, widespread and starts at an early age in Uganda, although it has reduced significantly over the years. Education and formal sector employment of the household head significantly decrease the probability that a child will work. Household welfare is another indicator of child labour, as poor households are more likely to have working children. A comparison of the three data sets reveals an increase in the percentage of children combining work and study over time. Nevertheless, the likelihood of child labour increases with the age of the child. The findings provide important results for informing policies to reduce, and possibly eliminate, child labour in the country.

Research Paper Number 166

An Econometric Analysis of Capital Flight from Nigeria: A Portfolio Approach

By Akanni O. Lawanson

This study provides measures of real capital flight from Nigeria based on the residual method adjusted for exchange rate fluctuations and trade misinvoicing. The portfolio choice approach is explored, in which the flow of capital is accumulated into stock and expressed as ratios of private stock of real wealth. An econometric analysis of capital flight, based on a portfolio choice framework, was conducted using the ordinary least squares (OLS) method. The results of the econometric analysis reveal that a number of factors systematically explain the portfolio behaviour of private wealth holders in Nigeria. These factors are consistent with earlier studies and include real GDP growth, real interest rate differential, parallel market exchange rate premium, inflows of debt-capital, domestic debt, fiscal deficit and change in inflation rate.

Research Paper Number 165

FDI and Economic Growth: Evidence from Nigeria

By Adeolu B. Ayanwale

Most countries strive to attract foreign direct investment (FDI) because of its acknowledged advantages as a tool of economic development. Africa – and Nigeria in particular – joined the rest of the world in seeking FDI as evidenced by the formation of the New Partnership for Africa's Development (NEPAD), which has the attraction of foreign investment to Africa as a major component.

This study investigated the empirical relationship between non-extractive FDI and economic growth in Nigeria and examined the determinants of FDI into the Nigerian economy. Secondary data were sourced from the Central Bank of Nigeria, International Monetary Fund and the Federal Office of Statistics. The period of analysis was 1970–2002. An augmented growth model was estimated via the ordinary least squares and the two-stage least squares (TSLS) method to ascertain the relationships among the FDI, its components and economic growth.

Results suggest that the determinants of FDI in Nigeria are market size, infrastructure development and stable macroeconomic policy. Openness to trade and available human capital, however, are not FDI inducing. FDI in Nigeria contributes positively to economic growth. Although the overall effect of FDI on economic growth may not be significant, the components of FDI do have a positive impact. The FDI in the communication sector has the highest potential to grow the economy and is in multiples of that of the oil sector. The manufacturing sector FDI negatively affects the economy, reflecting the poor business environment in the country. The level of available human capital is low and there is need for more emphasis on training to enhance its potential to contribute to economic growth

Research Paper Number 164

Fiscal Policy and Poverty Alleviation: Some Policy Options for Nigeria

By Benneth P. Obi

The rise in fiscal policy as a tool of macroeconomic management and the pervasive and widespread inequality in terms of income disparity have renewed interest in the use of fiscal policy to alleviate poverty and reduce income disparity. This study examined the potency of fiscal policy as a tool for poverty alleviation using a static real-side computable general equilibrium model as the framework. Three counterfactual scenarios were examined. These are transfers to the poor household, targeting of government expenditure and import tariff adjustment. The study observed that targeting of government expenditure seems to be the most potent tool for effective poverty reduction. Moreover, tariff adjustment tends to aggravate income disparity/poverty amongst households. In this light, the study proposes that in the quest for poverty reduction in Nigeria, fiscal policy should be designed so that government expenditure is properly focused to ensure that goods required by poor households are provided through public means.

Research Paper Number 163

Analysis of Factors Affecting the Technical Efficiency of Arabica Coffee Producers in Cameroon

By Amadou Nchare

This study centres on the analysis of factors that influence the technical efficiency of arabica coffee farmers in Cameroon. To carry out this analysis, a translog stochastic production frontier function, in which technical inefficiency effects are specified to be functions of socioeconomic variables, is estimated using the maximum-likelihood method. The data used were collected from a sample of 140 farmers during the 2004 crop year. The results obtained show some increasing returns to scale in coffee production. The mean technical efficiency index is estimated at 0.896, and 32% of the farmers surveyed have technical efficiency indexes of less than 0.91. The analysis also reveals that the education level of the farmer and access to credit are the major socioeconomic variables influencing the farmers' technical inefficiency. Finally, the findings prove that further productivity gains linked to the improvement of technical efficiency may still be realized in coffee production in Cameroon.

AERC Research Calendar 2007

Date	Event	Venue
November 2007		
28–30 Nov	Research review meeting of the scoping studies of the Asian Drivers Project	Dar es Salaam, Tanzania
December 2007		
1–5 Dec	Biannual Research Workshop	Dar es Salaam, Tanzania
7 Dec	Programme Committee meeting	Dar es Salaam, Tanzania
	Issuance of thematic research grants	Nairobi, Kenya
	Issuance of institutional attachment grants	Nairobi, Kenya
January 2008		
	Issuance of institutional attachment and partnership grants	Nairobi, Kenya
	Commissioning of plenary papers	Nairobi, Kenya
February 2008	Commissioning of the collaborative research projects country case studies for Growth–Poverty Nexus project	Nairobi, Kenya
March 2008		
	Senior Policy Seminar X	Addis Ababa, Ethiopia
10–21 Mar	Technical Workshop on Time Series Econometrics	Nairobi, Kenya
14 Mar	Annual meeting of AERC Board of Directors	Berne, Switzerland

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CONSORTIUM POUR LA RECHERCHE ECONOMIQUE EN AFRIQUE

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The Executive Director
African Economic Research Consortium
African Economic Research Consortium,
Middle East Bank Towers, Milimani Road,
P.O. Box 62882-City Square, Nairobi 00200,Kenya
Tel: (254-20) 2734150 Fax: (254-20) 2734170/173
www.aercafrica.org