

**PROCEEDINGS FROM THE SYMPOSIUM ON
AGRICULTURAL TRANSFORMATION IN AFRICA**

September 1993

**APAP II
Technical Report No. 137**

Editors:

**Richard H. Goldman
Harvard Institute for International Development**

**Steven Block
Abt Associates**

**Prepared for Agricultural Policy Analysis Project, Phase II (APAP II)
A.I.D. Contract No. DAN-4084-Z-11-8034-00**

Contents

Tables and Figures	iii
List of Participants	iv
Symposium Agenda	vii
I. INTRODUCTION	1
II. GENERAL SEMINAR OVERVIEW	2
III. WHAT IS HAPPENING IN AFRICAN AGRICULTURE IN THE 1990s	8
IV. SOME ASPECTS OF AGRICULTURE'S ECONOMIC CONTEXT AND AGRICULTURAL PRODUCTIVITY IN AFRICA <i>presented by Richard Goldman and Steve Block</i>	20
V. AGRICULTURE'S LINKAGES TO THE NON-FARM ECONOMY	52
VI. BREAKOUT GROUP REPORTS AND PLENARY DISCUSSION	61
Technical Change	61
Policy and Management of Agricultural Research	64
Constraints to On-Farm Adoption of New Technology	66
Plenary Discussion	68
Pricing and Marketing Policies	74
Non-Price Constraints on Agri-Business	76
Export Agriculture	79
Plenary Discussion	82
VII. PRIORITIES FOR INVESTMENT IN AGRICULTURE	101
VIII. REQUIREMENTS FOR INVESTMENT IN HUMAN CAPITAL	109
IX. CLARIFYING THE MAIN THEMES	117
APPENDIX A: Opening Remarks <i>by Ted E. Morse</i>	120
APPENDIX B: Agricultural Development in Africa: From the Frying Pan into the Fire <i>by George I. Abalu</i>	122
APPENDIX C: Agricultural Transformation in Zimbabwe <i>presented by Mandivamba Rukuni</i>	132

Tables and Figures

Table 1:	Agriculture's Direct Contribution to African Growth Under Various Sector Share and Growth Rate Scenarios	21
Table 2:	Africa: Food Production Characteristics by Agro-Climatic Zone	24
Table 3:	Cereals Yield Variability in Africa	25
Table 4:	Cereals Yield Variability	26
Table 5:	Average Annual Growth Rates of Agricultural Output	32
Figure 1:	African Food Production Growth Per Rural Population, 1980-89	28
Figure 2:	Real Exchange Rate (RER) Devaluation	29
Figure 3:	TFP Growth: Output in Wheat Units	33
Figure 4:	TFP Growth Rates by Region	35
Figure 5:	Partial Productivity Ratios	37
Figure 6:	Partial Productivity Ratios	38
Figure 7:	Alternative TFP Growth Estimates	40

List of Participants

Dr. George I. Abalu, Senior Regional Advisor in Food and Agricultural Policy and Planning, United Nations Economic Commission for Africa, JEFAD/UNECA, ECA, Addis Ababa, ETHIOPIA

Dr. Chris Ackello-Ogutu, Professor, Department of Agricultural Economics, University of Nairobi, P.O. Box 29053, Nairobi, KENYA

Mr. Bob Armstrong, Agricultural Officer, U.S.A.I.D./Zimbabwe, Harare, ZIMBABWE

Dr. James Beebe, Chief, Agricultural Policy and Planning, Office of Agriculture, Research and Development Bureau, United States Agency for International Development, Washington, DC, 20523-1809, UNITED STATES

Dr. Steven Block, Economist, Abt Associates, 55 Wheeler Street, Cambridge, MA 02138, UNITED STATES

Mr. Calisto Chihera, U.S.A.I.D./Zimbabwe, Harare, ZIMBABWE

Dr. Brian D'Silva, Agricultural Economist, Bureau for Africa, Office of Analysis Research and Technical Support, United States Agency for International Development, Washington, DC, UNITED STATES

Dr. Samuel K. Dapaah, Director, Policy Planning Monitoring and Evaluation Department (PPMED), Ministry of Food and Agriculture, Box M37, Accra, GHANA

Dr. Christopher Delgado, International Food Policy Research Institute (IFPRI), 1200 Seventeenth St., NW, Washington, DC 20036, UNITED STATES

Mr. Lual A. Deng, Division Chief, Environment and Social Policy, African Development Bank (ADB), 01 B.P. 1387, Abidjan 01, COTE D'IVOIRE

Dr. Josué Dioné, Regional Food Security Research Program Coordinator, Institute du Sahel (CILSS), BP 1530, Bamako, MALI

Dr. Simeon K. Ehui, Agricultural Economist, International Livestock Centre for Africa (ILCA), P.O. Box 5689, Addis Ababa, ETHIOPIA

Dr. Joyce Endeley, Senior Lecturer, University of Dschang, Dschang, CAMEROON
MAILING ADDRESS: c/o Dr. Herbert N. Endeley, The Registrar, University of Buea, P.O. Box 63, Buea, CAMEROON

Dr. George Gardner, Agricultural Economist, Bureau for Africa AFR/ARTS/FARA, Office of Analysis Research and Technical Support, United States Agency for International Development, Washington, DC 20523, UNITED STATES

Mrs. Hadija Gava, Principal Economist, Ministry of Finance and Economic Planning, P.O. Box 7086, Kampala, UGANDA

Dr. Kangethe W. Gitu, Senior Advisor, Long Range Planning Project, Office of the Vice President and Ministry of Planning and National Development, Box 56445, Nairobi, KENYA

Dr. Richard Goldman, Agricultural Economist, Harvard Institute for International Development (HIID), One Eliot Street, Cambridge, MA 02138, UNITED STATES

Mr. Jean Hakizimana, Agriculture Economist, USAID/BURUNDI, Bujumbura, BURUNDI

Dr. Rashid M. Hassan, Regional Economist, CIMMYT, P.O. Box 25171, Nairobi, KENYA

Dr. Anthony Ikpi, Professor, Department of Agricultural Economics, University of Ibadan, Ibadan, NIGERIA

Mr. Philemon Jazi, Southern Africa Foundation for Economic Research (SAFER), Harare, ZIMBABWE

Dr. Glenn T. Magagula, Professor and Deputy Vice-Chancellor, University of Swaziland, Private Bag 4, Kwaluseni, SWAZILAND

Mr. Jerry Martin, Managing Vice President, Abt Associates, 4800 Montgomery Lane, Bethesda, MD 20814, UNITED STATES

Mr. Felix M. Masanzu, Chief Economist, Agricultural Marketing Authority, P.O. Box 8094, Causeway, Harare, ZIMBABWE

Dr. Peter Matlon, Director of Research, West African Rice Development Association (WARDA), Abidjan, Côte D'Ivoire

Dr. Eric Monke, Professor, Department of Agricultural and Resource Economics, University of Arizona, Tucson, AZ 85721, UNITED STATES

Mr. Ted D. Morse, Mission Director, U.S.A.I.D./Zimbabwe, Harare, ZIMBABWE

Mr. Godfrey D. Mudimu, Chairman, Agricultural Economics and Extension, University of Zimbabwe, P.O. Box MP 167, Mount Pleasant, Harare, ZIMBABWE

Mr. Joshua Mushaori, Executive Director, Southern Africa Foundation for Economic Research (SAFER), Harare, ZIMBABWE

Dr. Wilfred Mwangi, Regional Economist, International Maize and Wheat Improvement Center (CIMMYT), P.O. Box 5689, Addis Ababa, ETHIOPIA

Mr. C. T. Nkwanyana, Principal Programmes Officer, Southern African Centre for Cooperation in Agricultural Research and Training (SACCAR), P/B 00108, Gabarone, BOTSWANA

Mr. Epitace Nobera, Agricultural Economist/Consultant, P.O. Box 563, Bujumbura, BURUNDI

Dr. Mandivamba Rukuni, Professor, Department of Agricultural Economics and Extension, University of Zimbabwe, P.O. Box 167, Mount Pleasant, Harare, ZIMBABWE

Ms. Erin Sands, Administrator, Harvard Institute for International Development (HIID), One Eliot Street, Cambridge, MA 02138, UNITED STATES

Mr. Gordon Sithole, Chief Agricultural Economist, Ministry of Lands, Agriculture, and Water Development, PB 7701, Causeway, Harare, ZIMBABWE

Dr. Dunstan Spencer, Visiting Research Fellow, c/o IFPRI, 1200 17 Street, NW, Washington, DC 20036, UNITED STATES

Dr. John M. Staatz, Professor, Department of Agricultural Economics, Michigan State University, Agriculture Hall, East Lansing, MI 48824-1039, UNITED STATES

Mr. Tobias Takavarasha, Deputy Secretary for Economics and Markets, Ministry of Lands, Agriculture, and Water Development, P.O. Box 7701, Causeway, Harare, ZIMBABWE

Symposium On AGRICULTURAL TRANSFORMATION IN AFRICA

Typical daily schedule:

Session 1	8:30 - 10:00
break	10:00 - 10:30
Session 2	10:30 - 12:00
Lunch	12:00 - 1:30
Session 3	1:30 - 3:00
break	3:00 - 3:30
Session 4	3:30 - 5:00

All plenary sessions will be in the Topaz Room. Breakout rooms to be announced.

Tuesday, June 1

Session 1 Plenary	General Overview of Seminar "Welcome to Participants" Mr. Ted D. Morse, Acting American Ambassador to Zimbabwe Director, USAID Mission in Zimbabwe
Session 2 Plenary	"What is Happening in African Agriculture in the 1990s"
Lunch Jacaranda 1	Invited Guest Presentation and Discussion: "Agricultural Development and Food Security in Africa" Mr. George Abalu Senior Regional Advisor in Food and Agricultural Policy and Planning, U.N. Economic Commission for Africa
Session 3 Plenary	Presentation: "Some Aspects of Agriculture's Economic Context and Agricultural Productivity in Africa" Richard Goldman (HIID) and Steven Block (Abt Associates) Followed by discussion
Session 4 Plenary	"Agriculture's Linkages to the Non-Farm Economy"
6:30 pm	Reception in Jacaranda 1, Sheraton Hotel

Symposium On AGRICULTURAL TRANSFORMATION IN AFRICA

Wednesday, June 2

Session 1 Agricultural Technical Change in Africa: Opportunities and Constraints

Three breakout groups:

- 1) Where are the high pay-off research areas?**
- 2) Policy and management constraints on successful agricultural research.**
- 3) Speeding up the farm adoption of new technology.**

Session 2 Key Issues in Agricultural Policy

Three breakout groups:

- 1) pricing and marketing policies**
- 2) non-price constraints on agribusiness**
- 3) export crop issues**

**Lunch
Msasas**

Invited Guest Presentation:

"Agricultural Transformation in Zimbabwe"

Dr. Mandivamba Rakuni

**Professor, Department of Agricultural Economics and Extension
University of Zimbabwe**

**Session 3 Agricultural Technical Change
Plenary Breakout group reports
Discussion**

**Session 4 Agricultural Technical Change, continued
Plenary Breakout group reports
Discussion**

Thursday, June 3

Session 1 Agricultural Policy Issues I

Session 2 Agricultural Policy Issues II

Lunch Investment in Agriculture

**Session 3 Human Capital and Institutional Capacity Building
Plenary Requirements**

**Session 4 Clarifying Main Themes from the Symposium
Plenary**

6:30 Cocktail and Dinner

I. INTRODUCTION

The Symposium on Agricultural Transformation in Africa, which took place in Harare, Zimbabwe June 1-3, 1993, was sponsored by the Africa Bureau of A.I.D. The Symposium was organized by Abt Associates and the Harvard Institute for International Development under the Agricultural Policy Analysis Project, Phase II. This meeting was a follow-on to a similar set of Africa Bureau sponsored discussions organized in the United States by Winrock International in 1992.

The three-day meeting in Harare brought together leading African policy analysts and agricultural scientists along with a small group of specialists from the United States. The meeting was opened by the USAID Mission Director in Zimbabwe, Mr. Ted Morse. His remarks can be found in Appendix A. The first day of the symposium was organized in a series of plenary sessions which, using the proceedings of the Winrock meetings as a jumping off point, explored the participants' views about the status of agricultural growth and transformation in Africa. Participants divided into break-out groups for part of day two to discuss technical and policy constraints on agricultural growth. The reports from these sessions were then discussed in extensive plenary sessions.

This proceedings contains three elements:

- 1) The breakout group reports.
- 2) An edited summary of the key statements and exchanges from the various plenary sessions.
- 3) The organized presentations which were prepared specifically for the symposium.

II. GENERAL SEMINAR OVERVIEW

D'Silva: It's a great pleasure to be here with this distinguished group of researchers, administrators and policy makers. I'd like to take a few minutes to give The Africa Bureau's perspective on the rationale for the workshop and why we are here. This workshop is being sponsored by the ARTS office, which stands for the Analysis, Research and Technical Support to the Africa Bureau. There are three parts to this office, or three legs. One that deals with economic growth and macro linkages. The other for the agricultural natural resources, and the third with human resources. The director of the ARTS office, Jerry Wolgin, has a slogan: that ideas are the best currency, and we're trying to focus on the whole issue of ideas.

As part of the Africa Bureau's research program, which is cross-cutting and cross-regional, we have research activities in the macro-economic growth area, in the agricultural and natural resource area, as well as in the human resource and development area. Central to the development or implementation of this research agenda are two aspects: one, the identification of research areas, and the other is implementation. A key aspect of this is that African research institutions should participate in the identification of the research topics. The second is that African researchers and institutions should be primarily implementing this research. So, this workshop is a start in this direction, whereby the individuals who are gathered together around this table should be playing a leading role in the definition of the types of research programs which will be implemented by these institutions as well as other institutions and other individuals within the continent.

Now, coming to the whole topic of African agriculture and what's happening to African agriculture, the big question is: Is there a transformation taking place? We count the different views based on different experiences, and we hope we're able to get into a frank discussion of these views during the next three days.

In terms of what we hope to get out of the workshop, I hope that we will be able to focus on some of the questions which have been raised. This is one workshop which we hope we come out of with questions, more questions probably than answers, but at least this will set the stage for work and try to define in a much closer context what we're going to be doing.

Goldman: We have put together the schedule for this symposium in a way that we hope is not too constraining. We consciously designed the first day of this symposium to try and strike some continuity with the activities that the Africa Bureau supported with Winrock International, which ultimately resulted in the book *Agricultural Transformation in Africa*¹, which we sent to all of you. I think Chris Delgado, and Chris Ackello are the only two people here who were also at that meeting.

¹David Seckler, ed. 1993. *Agricultural Transformation in Africa: A Round Table Discussion*. Arlington, VA: Winrock International Institute for Agricultural Development.

That round-table was distinguished primarily by the fact that the dominant group at the table was a group of American experts on Africa. This meeting is consciously designed so that the dominant group is a group of African experts on Africa. I thought it was appropriate that you be exposed to the round-table discussions and that we could start the meetings with your reactions to them. I hoped they could serve as a stimulus for gathering your own thoughts on some of these broad topics.

In the afternoon, Steve Block and I are going to be presenting some analysis of the African data. The idea there is to juxtapose some of the impressions and perceptions that come out in this morning's discussions with the record of statistics and an interpretation of the record of statistics to see if we can stimulate some discussion about how we rationalize these perceptions in the cases where there are conflicts. In the cases where there is agreement between our perceptions this morning and the perceptions that are revealed by data, perhaps we have some common ground for a broader set of generalizations about agriculture in Africa.

The first part of the Winrock book gives a fairly broad discussion about the meaning of agricultural transformation. Peter Timmer's presentation in that book talks in terms of stages, from the embryonic stages of economic development and agricultural growth right through to the problems of a highly articulated and developed economy. I think that in our discussions here we need to be concerned with the rather earlier stages of agricultural transformation.

There are two broad aspects of agricultural transformation that we need to be concerned with. One is a more technical aspect of agricultural transformation. This is the "changing the production function" aspect of agricultural transformation: technical change, infrastructural change, management changes on farms and that sort of thing. One of the important things that we need to do in this meeting is to try to get some sense about what you all think of that aspect of structural or economic transformation in agriculture in Africa.

As I read through the Winrock proceedings, there was, I thought a very important debate going on. There were some at that meeting who were rather pessimistic about the current stock of new technology or unutilized technology in Africa, which seemed to point to a need for agricultural research, particularly, as a strategic investment in Africa.

There was another group of people who seemed to be saying that there is a lot of good and appropriate agriculture technology available. The real problems are adaptation of that technology to different zones and regions and simply getting the technology to farmers. That is clearly a different kind of problem. I think we need to bash that around a bit and see where we think the real problems are on the production function part of the structural transformation. I'm sure that the answers are going to be different for different parts of Africa.

The second part of agricultural transformation I would characterize as a linkage dimension, and that dimension takes on a number of different facets. We're concerned with farm/non-farm

linkages; with rural-urban linkages. Agricultural transformation usually, but not always, seems to be a part of a larger process of economic development that involves more reliance on input markets, and that seems to go along with the technical change part of the transformation. It involves greater articulation between farms and output markets, whether they be export markets or domestic markets for food consumption. The transformation also raises issues of the circularity of linkages: Is agriculture's principle role to provide input such as foreign exchange and other surpluses so the rest of the economy grows? Or is foreign exchange actually constraining agricultural growth?

I didn't see that kind of circularity talked about very much in the Winrock conversations, and that may have been largely because of the kind of Asia-Africa comparison that seemed to be important in those discussions. But clearly in Africa there's an important question in the short and medium run about whether foreign exchange is constraining agriculture or whether agriculture is constraining foreign exchange. And I think that the answer to both questions might be yes. How do we deal with that? So there's an important dimension of agricultural transformation, which is linkage based.

In the Winrock meetings there were a series of important questions that were asked about that. There were some people who felt that in Africa demand linkages between the agricultural sector and non-agricultural were not being promoted; that there were policy reasons and other reasons why the demands that were associated with urbanization were being projected outward, and were largely being satisfied by imports rather than by domestic production.

There were a couple of other key ideas that came out of the Winrock meetings that I think we need to think about. I believe it was Chris Delgado, actually, who said that the principal question for agriculture and agricultural transformation is whether there is a broad base for aggregate agriculture supply response. That certainly is an important question that we need to address. The structural adjustment approach to agriculture in the short and medium run seems to be concerned less with aggregate supply response issues than it is with the foreign exchange response of agriculture. And there's a difference. We need to assess the paradigm that says that what we really need to do is promote the tradable part of agriculture, recognizing that there may be some trade-offs between the tradable and non-tradable part of agriculture, because of the foreign exchange dimensions of that policy. Is it possible that you can't really promote the tradable part of the agricultural sector without also finding ways to break constraints on the supply response of the non-tradable part of the agricultural sector?

I think the answer to that question is going to vary around Africa, but it's certainly a critical strategic question in the current era of structural adjustment programs for agriculture.

There was a set of individuals at the Winrock meeting that emphasized resource degradation, and I thought that this was a rather pessimistic dimension to the meeting. They seemed to be saying that modern technologies, the biological and chemical-based, the marketed input-based technologies were not really viable in many parts of Africa. They lead to resource degradation. The combination of population growth in rural areas and perhaps these new technologies was not going to be a

sustainable solution to the agricultural problem. There were other people who claimed that modern and chemical and biological-based technologies were strategic to agricultural development and economic development in Africa. That was an important debate that went on at the Winrock session, and it's probably one that we need to pick up on here as well.

And finally there was the question of whether an agricultural transformation is underway. There are lots of examples of agricultural change in Africa. The question is when is an example simply a special case? When do we have a critical mass of examples of ongoing change so that we can say that yes, something important, something strategic is happening.

We all have experiences that are limiting in the sense that they represent perhaps a rather small part of the big African puzzle. So to some extent all of our knowledge is case study knowledge. We have to try to evaluate whether this knowledge constitutes some real validation of the notion that agricultural transformation is going on. We have to find some way of differentiating Africa so that we are not trying to generalize broadly about the whole continent, but to recognize that our observations may be important and strategic, but limited in terms of regions.

How shall we think about regions? Should we think about them in terms of geo-political zones? Should we think about them in terms of political-economic zones or in terms of agro-ecological zones? What's the most useful way to differentiate Africa so that we can understand what's going on, and we can understand whether experiences in one region or zone are providing insight into what we can do in other regions or zones.

I would like each of you to consider over what domain your own experiences and observations seem to be valid. I think that if we can do that, and if we can continue to challenge each other around the table in that regard then we will have pushed forward our knowledge and understanding of this process of agricultural transformation.

At dinner last night I was talking with John Staatz, and he said that we know that Africa and the whole development process is resource-constrained, and it's maybe more resource-constrained now than it ever was, particularly in terms of external resources. And we all know, in a sense, what the ideal picture is, the ideal outcome in terms of agricultural change. What we really don't know is how to allocate resources so that the most strategic constraints are broken. How do we sequence change? I think we need to spend a fair amount of time thinking about that in this symposium: How do we come up with an operational agenda? We have been spinning wheels for a fairly long period of time with broad concepts, and it's extremely difficult to move to an effective operational agenda. This is a group that has enough experience to be able to help people in that direction.

Finally, there are a couple of problems that I have just personally reacted to when I've heard various cases about agricultural change in Africa.

One has to do with population growth. We have two very contrasting ideas about the role of population growth and agriculture, not only in Africa but generally. One is the Malthusian idea about population growth, and that is that it leads to diminishing returns in agriculture, that it's not really a base for agricultural growth or transformation.

The other contrasting view about population growth is represented by Esther Boserup's ideas, and her ideas have been picked up by many others, and that is that in many cases population growth and population densities lead to dynamics in agriculture that actually promote total factor productivity.

Now, many African regions are in the process of transition from economies that in relative terms have been land-abundant, population-sparse economies, certainly by Asian standards, to much more population-dense land-scarce economies. Is the Boserup hypothesis the one that's prevailing and going to prevail, and what can we do to make it the one that is more likely; or is the Malthusian hypothesis the one that's going to prevail?

There are also two conflicting paradigms about technical change. One is that technical change increases agricultural productivity; the other is that technical change leads to resource degradation. I've already alluded to this conflict in the Winrock conversations. What can we do to ensure that technical change and resource degradation are not going hand in hand? Certainly in many parts of the world we've seen examples where one leads to the other and we've seen examples where technical change has gone on for an extended period of time, and resource degradation has not been a strategic issue.

Another question pertains to the role of agricultural growth in economic development. Does agricultural growth lead to sustained economic development? Or is agricultural growth largely wasted in the aggregate economy by bad macro-economic policy? Again, two different ideas, two different paradigms, two different themes. We can find examples of both, and we need to consider here where we think the one process is underway, where we think the other process is underway, and what steps can policy makers take to avoid the pathological process, the one where the agricultural growth occurs, but it is wasted and ultimately stunted and truncated by bad macro policy.

How do we ensure that the micro lessons, the case studies, which are a very important set of data for us add up to something more general? Similarly, how can we learn from the recorded data, the macro data, the aggregate data? Both types of data have their limitations. The case study data has its limitations, personal observations have their limitations, the numbers clearly have their limitations. And yet in both of these databases there's a great deal of information. How do we extract it? How do we use the observed conflicts in those two databases where they occur to generate new knowledge, rather than simply throw up our hands and say, well the data must be wrong. They may be wrong, but that's a council of despair. It's a much more productive process to proceed on the basis of the assumption that the data are right, and challenge ourselves to see if we can figure out why they're in conflict, what behaviors are going on that we don't understand that might lead to the apparent conflicts in data.

Spencer: There is one issue that kept coming up in the Winrock meeting that has been disturbing me.

Timmer's thesis was that for Africa to develop and be competitive , we have to get our real wage rates down. Is that the only path of development? If it implies that we have to make a significant section of the population poorer, even if that section comprises the urban elite, is that really is what development should mean? I wonder whether some people might want to give some answers to the question? I don't have any answers.

Staatz: I think the analytic issue is that the cost of labor has to fall. Now, that doesn't necessarily mean that wage rates have to fall if you can increase productivity. I think -- as I read Timmer it was sort of a council of despair that you can't do much about productivity, so you have to drive down real wage rates. But I hope in our debate we look at both aspects of the cost of labor: wage rates and productivity.

III. WHAT IS HAPPENING IN AFRICAN AGRICULTURE IN THE 1990s

Goldman: I thought it was important to use this broad topic as a way of us getting to know each other, to get our various views, and also as a way of reacting to the part of the Winrock roundtable which was also about what people thought was happening in African agriculture.

So, who would like to lead this off?

Is there anybody who'd like to respond to the question about the Winrock sessions, or present their own version of what they think is going on in African agriculture? What do you think the salient points are?

Spencer: I think it is absolutely essential when we discuss what is happening to agriculture in Africa today that we are careful to disaggregate the continent into its different parts based on agro-ecological zones, as well as by political and socio-economic systems.

The second point I'd like to see addressed is that relating to the question of technical change, whether there is, in fact, an adequate stock of technology.

The conclusion from the Winrock meeting was stated very clearly at the start: there was no disagreement about the adequacy of the stock of technology. Everybody seemed to have agreed that it was adequate, and the outstanding issue is modifying available technology to suit special ecosystems, or getting the enabling environment correct. Well, I guess it will be no surprise to some people here that I don't agree at all with that conclusion. For me, when we talk about the stock of technology that is on the shelf, it has to be an "active" collection. If there is no demand for it, for whatever reason, if it cannot be extended to farmers, then what you have, in my opinion, is a tomb full of "dead" technologies. You have to have massive changes in the production environment to be able to use most of the so called available technologies, in most parts of Africa.

To me, it is not feasible in the near future to envisage that we would have these structural changes, and therefore, we need to now concentrate on developing technologies that will fill the gap between the present situation and the stage where we probably will be fifty years from now -when the environment will have been changed, irrigation systems, input delivery systems, the transportation networks, will all be in place. It's going to take 20 to 50 years to put the infrastructure in that would allow us to effectively use the present stock of technologies, even in most of the savanna or forest-savanna transition zones that are supposed to have a lot of potential for agricultural development.

Ehui: It's no secret that agricultural development in Africa actually is not moving as fast as we would like to see it.

I think one aspect that has received less emphasis in the Winrock document is the role of national research institutions and other human capacity building mechanisms to help raise the level

of agricultural productivity in Africa. I think it is important that we put more emphasis on that, because whether we like it or not, the development of the agricultural sector in Africa can only take place from within. Unless there is a stock of capacity available on the continent, development will not be sustainable.

Currently structural adjustment programs negatively affect the research capacity of many countries. Agricultural area is among the first sections to be cut when budgets are reduced.

So I think that one issue we need to reflect on is how can we ensure that we have adequate scientific capacity on the continent to address the development issues?

Goldman: Just quickly to follow up on that. Is there anyone that comes from a place where the budgets have not been severely slashed for research? OK, the only people who have raised their hands are -- Mrs. Gava from Uganda, and Mr. Dapaah from Ghana.

Endeley: As we talk about the various strategies of what transformation in Africa's agriculture we would want to see, the strategy of diversifying Africa's agricultural export to include food and ornamental crops (and not just traditional export crops such as cocoa and coffee) have gained more importance in the agricultural development plans of many African countries.

While the policy of diversifying agricultural export seems good, food crop becoming export crop has implications for the farm household economy, family food security and women's economic status. The policy will create a situation where men and women will be vying for the productive and profitable sectors of the food economy. However, it is very unlikely that women will be able to compete with men on an equal level due to women's limited access to factors of production and household responsibilities demanding women's time which could be invested in agriculture. Unable to get into full scale commercial food production as men, women are likely to lose the progress achieved in the past in moving from subsistence to commercial production? Are women going to be relegated to subsistence food producers (mainly for family consumption) while men probably take over the profitable aspect of commercial food production.

The caution here is that whatever policies and strategies we think are important in transforming Africa's agriculture, there is a need to pay attention to gender relationship, family food security and household welfare.

Magagula: I think basically I agree with my sister over there regarding the importance of having an idea of what is happening in Africa with respect to the gender relationships.

Much has been said about this issue, but in most cases it has been written by people who don't have the foggiest idea of what actually is the situation in Africa, and I think that if we are going to be identifying some of the areas which need to be explored by Africans, certainly this is one area which, in my view, must be explored for a change, by us, as Africans.

As we explore this area, let's look at possibilities now of charting a course towards convergence, rather than the divergence which we currently see in the literature regarding gender relationships. I see this as an important agenda item, and an important priority. But I see it in terms of looking at ways of bringing us together as individuals, rather than looking at what our roles are as females or as males.

Mwangi: Let me begin by agreeing with Mrs. Endeley that perhaps what is so lacking in the Winrock debates was the role of women, especially on how for example we in agriculture can factor in the time constraint that is faced by women in agricultural society. The omission of women from extension systems in most of Sub-Saharan Africa is also a problem.

Turning briefly to the question about trends in African Agriculture I am concerned that cereals food aid has increased much more rapidly than commercial imports. Almost 50% of the households in most of Sub-Saharan Africa are food insecure. Agriculture in Africa in 1990 is doing very poorly.

Dapaah: Is there agricultural transformation in Africa? I'm going to be very controversial. Sub-Saharan Africa is a very huge area, 22 million square kilometers. A population of almost 500,000,000. Now, this very vast area had a GDP of I guess about \$163 billion for 1990. Agriculture contributes about 48%, industry 16%, and services 36%

What I've done is to try and compare this with the smallest country in Europe, Belgium, which has 31,000 square kilometers, a population of 10 million and GDP of \$192 billion in 1990. The GDP of Belgium was significantly bigger than that of Sub-Saharan Africa in 1990. Agriculture contributes only 2%, industry 31%, and services 67%. Sub-Saharan Africa's contribution to world trade is about 1%, and its share of world GDP is 0.73%.

Going by Timmer's definition of agricultural transformation, and I will read it: "Agricultural transformation is the process of converting household-oriented, subsistence-type structures (that is, decision-making units in rural households that are concerned with production primarily for home consumption and subsistence needs and that have relatively few and highly imperfect market connections to the urban economy and to world markets) to commercial units that have highly efficient linkages to the urban and world economies." If this is our concept of agricultural transformation, then it is going to be very difficult to see how anybody can find that in fact agricultural transformation is occurring in Africa.

I referred to the size of Africa, because as my colleague Spencer indicated, there is a lot of diversity. Roots and tubers are very important in quite a number of African countries. In addition, the economies and management of roots and tubers are so different from that of cereals. The Asian model seems to be centered around rice. I mean rice and cassava have so many different attributes that in fact there may be few lessons to be learned from Asian rice-based systems.

Now, if you go back to the definition, once a country develops highly efficient linkages between the rural and urban sectors and the world economies, then it is my view that the country is no more a developing country, because it is difficult to see how a country can develop highly efficient linkages without highly efficient transport and communication systems, highly efficient financial systems, highly efficient educational systems, and very capable labor in terms of education and business know-how.

I'm not saying that Africa should be judged differently. But if you start with this sort of definition, my view is that it is really going to be very difficult to identify any transformation. That definition brings conceptual difficulties, measurement difficulties, and interpretation difficulties.

Ikpi: I see agricultural transformation as involving, first of all, acceptance and increased use of improved technology that leads to desirable technical change. So, in discussing agricultural transformation, we should be looking at the effect of present active stock of technologies on the production function; not the ones in the "tombs" that Dunstan referred to, but the active ones that are actually there and are useable. Have they been accepted? If they have been, acceptance is one thing, continued use is another aspect of technology adoption.

Then the second aspect of agricultural transformation is increase in farm sizes. Have there been increases in farm sizes throughout Africa? Because of the increasing population pressure, I don't think that will be the case. But it isn't only physical farm sizes we're talking about now, we are also talking about productivity and production from the little acreage that are available to farmers. I think in most countries in Africa we would say that there has been a little increase in farm production, given the limitation of the land area.

So, as I consider agricultural transformation, I try to think of whether or not each of these aspects of transformation has been fulfilled: for acceptance and increase in improved technology, I would say yes and no; for increase in farm sizes, again I would say yes and no. For the third part (increase in investments in agricultural production and processing), I will definitely say no here; there has not been an increase in investments in agricultural production and processing. This is because the level of private sector investment which is supposed to provide the critical momentum is extremely low. The experience that we have had in terms of research that has been completed, especially within Western and Central Africa, is that unfortunately politicians and chief executives, people of authority in positions of responsibility, seem to be the ones that get the money intended for small-scale farmers. The intended beneficiaries, the small-scale producers, are not being given what is theirs.

The result is low investment in agriculture. There's so much demand for the little resources these small-scale farmers have. They have to invest in their children, they have to invest in so many other things that are not done for them by government in order for them to survive. So, what is left for them to actually put back in agriculture becomes so little that the type of transformation we are expecting within the African continent cannot take place for a long time. And so the basic

underlying constraint here is the amount of funds available to those that should actually mobilize agriculture.

The fourth area under that definition of transformation is the response to prices, policy changes and other general development linkages. Small-scale producers are very responsive to price policies, because there is nobody in Africa who is a farmer that you can say is a completely subsistence producer. Everybody tries to sell a bit of what is produced for one reason or the other. So, they do respond to prices -- even within the very short run they do respond.

Then the final aspect of that definition is the focus on agricultural production, whether it is consumption-oriented, or whether it is commercial-oriented, or, in fact, it is a mix of the two. We're now trying to debate whether it is skewed too. And in that respect I will say yes, because structural adjustments that are taking place within most African economies tend to increase consumption-oriented production with the inadvertent move to commercialization. So, if we took all of these into consideration, I'd say that there has been some limited agricultural transformation in Africa.

Goldman: You seem to be implying that at the margin the rate of return to investment in agriculture is quite high, that the reason why there isn't more is because of a competing demand for very limited funds; whereas I thought I heard Dunstan say that there really isn't very much relevant technology available for African agriculture. If I read him correctly and I read you correctly I'm a little puzzled as to why the rate of return is so high in agriculture. Or did I misunderstand either of you?

Ikpi: First I don't think I have contradicted what Dunstan said. There are some technologies that have been adopted and when you take those few technologies that have been adopted, and apply the rate of returns to what has been done, you will see that agriculture has definitely moved. Its transformation is increasing. But it is not all the technologies that are available that have been accepted or adopted. Many of them are brought up but nobody uses them, and they just die a natural death.

I don't know what Dunstan has to add.

Spencer: Let me try to see if I can explain it a little bit more. If you look at investments by farmers, by small farmers, i.e. whatever technology they invest in, you find that they have a very high return. It's a very strong selection process that goes on. Thus, the returns to investments which the farmers make, I think is very high.

The question is whether this translates to the aggregate level. Here we have the problem that has been highlighted already. There is not sufficient investments by small farmers to make a significant impact at the aggregate level. To me, that is because the range of technologies that they're investing in is very small. Consequently, if you look at the global investment in agriculture for

technology development and transfer in general - the rate of return has been very low. That is because most of the investment has yielded zilch.

When you go to the farmers and look at what they have actually invested in themselves, you have very high returns. That is because farmers are very good decision-makers, and are very knowledgeable about what they want to invest in. If we paid more attention to what they invest in we could get quite high rates of return at the aggregate level.

Goldman: This is a critical question that we need to be pursuing as we go along, because if we're really shooting for aggregate growth rates in agriculture of let's say on the order of 3% the real question is whether there are enough opportunities out there on the farm to aggregate on that level. And if they aren't, then where do we go to get those opportunities? That's the question that I think needs to be addressed.

Deng: Let me maybe go back to economics 101, and to answer your question of what is happening in Africa agriculture in the 1990s. If we go back to basic economics, we say demand creates its own supply. Take the urban group. I'm a nomad, but I think I'm a Sheraton nomad. What is my demand for food and other things? My demand is biased mostly towards imported goods and services. My urban demand is creating a supply outside of the country. So, it's not being reflected at the African household level. So, there's no supply being created at that level.

Let me turn it around, and this is more relevant to our colleagues in the research centers. Let us take it from the perspective of a farmer, of a farming household, and demand for technology. The demand for technology there I don't think is being created, and Dr. Spencer may come to my aid later on, so the centers are trying to supply technology, which nobody is demanding.

Maybe we have to go back to basics and let us talk to farmers and let us find out what is their demand, and we'll go out there and we'll create supply.

So, I see that as a major challenge facing us. Last week the vice-president for Africa of the World Bank stated clearly that it's necessary for the World Bank to assist Africa to do what it wants. It's no longer appropriate for the Bank to have to come and write development plans and other things for Africa.

Let me move on to the issue of structural adjustment. My colleagues, especially my Sudanese colleagues, find it difficult that I'm very enthusiastic about the structural adjustment. I think any success of adjustment is in the area of agriculture, though.

African governments have realized that it has not been the business of government to be involved in producing *and* selling tomatoes. That thing can be done by others. But it is the duty of the government to produce public goods, researchers among them, and infrastructure. And I think most of the African governments have realized that as well.

I see agriculture as the engine of growth. I see agriculture as the tool for alleviating poverty. I see agriculture as an instrument for protecting the environment and promoting growth, equity, and stability.

I wanted to get some clarification, from the researchers on these technologies being available on the shelf. I've attended a few meetings where we have a number of African researchers where they say that we have technologies on the shelf, and these technologies can be used. What is missing is getting them to the farmer. At least for Uganda, because the extension budget has been very small, and that's why we are making efforts to put more funds into extension.

We are putting more funds into research mainly to enhance the linkages between researchers and farmers. When a technology is developed on the station it also has to be right for the farm and the farmers. That is one of the weaknesses we have. You may develop a variety which is very high-yielding, but then when you get it to the farmer he says this is not palatable, or it is taking a longer time than what is wanted. I think all the professionals know the pitfalls of some of these technologies.

Look at what they're doing, see what is the priority, trim it, adapt it for what is really needed.

My other comment, is that in many of our countries, if I take Kenya, Uganda, and maybe Tanzania, you find that we are trying to make our exports more attractive. But then when you look at what your neighbor has done, what he thinks should be the way to go forward, it is exactly the same as yours. You are competing among yourselves. Now I think this is a problem we have, because in Uganda we are trying to promote horticulture products, and we know that Kenya is ahead of us, and I'm sure Tanzania is also trying to do the same, and we are all competing for the same markets.

Martin: I just had a brief comment about what I thought was missing from the Winrock report that I read, and that is the input of African agri business. As structural adjustment has taken away the marketing function from produce marketing boards, African businessmen and women have taken up that challenge and have faced a lot of constraints. What are those constraints? What are the problems that they face?

In the area of horticultural exports and non-traditional exports, there are some very important changes going on in how those markets are structured and how business people in Africa are taking advantages of those opportunities, or how they're being constrained from taking advantage of those opportunities. That was an area that was neglected in the report, as well as in assembling this conference.

I think we should have private traders here who can tell us directly what are the changes that they've come up against as these changes have occurred in policy environment over the last ten years.

Finally, one quick observation: I know very little about agricultural research, but among the people that I've talked to in the marketing sector, they feel that agricultural research is divorced from the markets, that research institutions are focussing on their own programs. For example in Madagascar I know the markets indicate that ginger and tumeric and dried beans and flowers are really a good opportunity for them, but there is no research currently being conducted in Madagascar by the national or international research centers on those products. They've focussed on rice exclusively for the last twenty years. So when opportunities occur business people and farmers don't have the opportunity or don't have the technology to take advantage of those opportunities.

Hassan: I think, Mr. Chairman, I've listened to very pessimistic views about what is happening in Africa.

I have no problem with the definition of agricultural transformation, but the problem I have is the data that people use to show or test whether there is or there is not an agricultural transformation, especially when the aggregation is across Africa as a continent.

What part of the economic activities in African countries is reported in the aggregate data of the national income accounts? What is the proportion of milk that is created that is reported in that count that you will use, for example to drive the productivity index?

I think we have to be very careful. I'm not sure if we have concluded whether there is an agricultural transformation or not. But if we want to make that conclusion, we'd better be very careful with the data, especially if you are talking about a continent.

Also, we should not ignore the negative factors which disrupt the process of agricultural transformation. How many countries have been suffering from drought, civil wars, lack of good governments, and poor macroeconomic management?

I think people will have to filter out those negative effects and look at these trends in stable economies and political systems, to see whether there has been an agricultural transformation.

For example, I don't think anyone has any data about agricultural production in Southern Sudan. That place has been at war for the last thirty years. And I wonder how you put that together with a place like Kenya where there is much better information about what is happening in the agricultural sector.

I want to paint a more positive picture by talking about the case of Kenya. We have data that show there is agricultural transformation in Kenya, in the maize sector. But we still have a problem there. The history of technology generation and dissemination in Kenya has focussed on producing technologies for the high pay-off areas, the high potential lands, and the commercial farms, the large-scale farms.

The data right now show that there is almost 100% of option of hybrid maize in those areas. There is also a very high rate of adoption of hybrid or improved technologies in other agri-climates in Kenya. Those are misplaced technologies. For example, in the mid-altitude region of Kenya, the mid-altitude environment which requires a different technology and which produces 40% of the maize in Kenya, there have been only two new varieties at least in the last thirty years, and the last one was in 1970. Since 1970 there were no new varieties produced by the Agricultural Research Institution in Kenya for that particular environment, which produces 40% of the maize.

In contrast, there are eleven varieties available for the high altitude areas, and in the last ten years there were five new varieties produced or generated for that environment. So, we have to reorient the research strategy and the research policy towards new demands that are developing. The agricultural research machinery is still producing technologies for the very old target group. If you look at the highlands in Kenya, you will see agricultural transformation, but if you put Kenya together, you will not see it.

Nkwanyana: There's an impression that has been created in the Winrock discussions that technologies are available on the shelf. In most of these other countries there is some technology but that technology is irrelevant, because it has been developed in isolation. Farmers have not been involved, and their felt needs have not been taken into account.

Funding for research in our region has gone down, and we are spending over 75% of the budget for research on salaries. There's very little funding that is going to the operational activities of research. One wonders what type of technology is being developed, because researchers are not even able to go and visit the farms. The only thing they do is just to work on the station on problems that they perceive the farmers are having.

This problem of technology on the shelf has been the problem of the donors themselves. We have projects within our countries, that are there for a specific time, say five years. Their measure of success in that period is the number of experiments done, the number of technological packages developed and not the number of farmers that have developed the technology.

I believe that our research should be demand-driven. Demand should not come from outside the production sector, say from a donor, but it should come from the producers themselves.

Endeley: What is happening in Africa? In Cameroon, for instance, as far as agricultural research is concerned, the capacity for research institutions and universities to carry out tangible and productive research needed to address present day problems and to make policy has been drastically reduced. Only last year the Cameroon government created a Ministry of Scientific Research but I can tell you that it is almost a figurehead institution due to severe financial constraint. While the tendency since the beginning of SAP period (mid 80s) has been for families (than in the past) to produce portions of their family food needs, research institutions and the extension service are unable to meet the demand of the number of new farmers. The majority of farmers still use traditional farm tools, inputs and skills.

The government did call for agricultural diversification because of the declining prices of the traditional export crops. So, you have a lot of families intensifying their food production activity. In other situations, investments in export crop farms have stagnated or been reduced or been diversified into food crop.

In the Winrock book where they talked about substitution, I got the impression that some people were saying that substitution is not necessarily growth in agriculture. And I am not too sure of that, because if by the hardship caused by the structural adjustment people are able to produce substitutes of goods coming from developed countries, I think it's a form of transformation which can lead to growth. I don't know -- Ghana and Nigeria I think have done a lot on that. And my impression is that if substitution, producing goods that meets the demand of the people means less use or less demand on foreign exchange, what does that imply?

I think more and more we should try and really see how far we can promote substitution to the extent that we can replace a lot of goods that are being imported right now.

Mrs. Gava raised the question about the strategy where the same recommendation for diversification has been proposed to countries within a particular region e.g. ornamental plant for East African countries. Isn't diversification into horticulture for export by so many countries going to cause the same glut in international market as we're having in the traditional export crop sector?

I think one way to get around that is that Africa should be divided into regions. What are the demands within a particular region? We should see which country can best produce a particular crop, and is capable of meeting the demand of a particular crop rather than let every country try to produce a little of the same crop that is being demanded within a particular region.

With this specialization, regional and bilateral trade agreements in agriculture can become a policy means of transforming Africa's agriculture.

Rukuni: I went through the Winrock book. I really enjoyed reading this book, and I agreed with most of what I read in here. And I'll quickly just go through what I agreed with and what I didn't agree with.

I think agriculture is still the most dominant and efficient industry in Africa. It is probably still the legitimate engine for economic growth.

So, starting from that premise, I say there's a lot of stuff I agree with in the book that goes along the lines that not enough investments have been made in the right areas over the last three or four decades.

Now the question of technology on the shelf.

In Zimbabwe, the adoption of hybrid maize varieties by farmers went with very little extension. When we went out asking the extension agents how many farmers used hybrid maize varieties, they were telling us 10% to 12%, meaning they work with 10% to 12% of the population. When we went out, it was close to 100%. It's only bad technology that needs good extension. But this example of technology on the shelf may be an exception.

I have said to the Director General of CIMMYT once, when I was still Dean of Agriculture, when we were shouting about what used to be done, and I said to him what we need in this region is drought-tolerant maize varieties. And he turned around to me and he says, well, we don't have that capacity at CIMMYT. We are working on other stuff at the moment. Then I talked to other people and they tell us that, well, you know drought tolerance is a complex issue. Then breeders have to work with physiologists and so on, but breeders are the cream of the CG system. They don't want to work with the lower beings dealing with other issues. Also, the CG system is just not paying enough attention to some of the critical issues, like the soil fertility problems, crop management.

Labor is a major problem. Most of the technologies on the shelf require that farmers actually pay more attention to timely performance of certain activities. Usually that means competition for labor with other activities that farmers have to perform, and this question is I think so critical in technology generation.

Irrigation. I think more attention should be paid to small scale systems, and what I'll call supplementary irrigation type of systems, where you're not going full scale to produce a crop under full irrigation, but you're supplementing rain-fed agriculture. There's evidence that there's just bundles of groundwater which could be tapped by farmers, but we don't have the technologies, low-cost pumps and so on.

Africa also suffers from poor institutions. Institutions in terms of not only research but a good number of other institutions in human capital development. The reason I'm bringing this up is I think there are a couple of investments among about five or six which also need to be put in place at the same time. The problem is we need to put these away one at a time. The question of food security becomes important because we are now faced in Africa with a situation where governments are pursuing structural adjustment programs, which I might have to say, are very good accounting programs, but very poor investment allocation activities. I mean I've looked at our own here in Zimbabwe. Very little is said about what needs to be done, what priorities need to be placed on agriculture, or any other sector, for that matter. The question is, just go ahead and cut your expenditure; whether you cut the most productive part or the least productive part becomes the political bargaining process in the system. And you know what the end result is of that.

So, if economic growth is going to be the long-term solution to poverty, and food security, then that means that for another thirty or fifty years government has to pay attention to the poor 20%, 25% who won't be able to cope in the prevailing circumstances.

Goldman: We can pick the rest of this up later. I thank you all for your contributions this morning.

IV. SOME ASPECTS OF AGRICULTURE'S ECONOMIC CONTEXT AND AGRICULTURAL PRODUCTIVITY IN AFRICA

Presented by Richard Goldman and Steve Block

Goldman: Steve Block and I are going to make two presentations this afternoon, both of them based on numbers from the commonly available African data base. In the first presentation I will try to do two things: call attention to some connections between agriculture and the larger economy in Africa and, secondly, to highlight the diversity within Africa when it comes to thinking about economic implications of agriculture and policies. There is no attempt in my presentation to tell a complete story. I simply want to stimulate some thinking, and to get your reactions regarding whether the data in these cases are reasonably accurate. Steve's presentation is a more ambitious one and represents the fruits of a good deal more work. He's going to explore the trends and patterns of factor productivity in African agriculture.

In Table 1, I am asking the question, "How important is agriculture in the economies of African countries?" The question is answered in this particular case by the share of agriculture in GNP. And I found that by breaking it into three groups, a high GNP share country, a medium GNP share countries, and the low GNP share countries, that some interesting information emerged.

About half of the Sub-Saharan population, excluding Nigeria and South Africa, lives in countries, which on a population-weighted basis, have an average GNP share in agriculture of almost 50%. Another group, almost a quarter of the African population, excluding Nigeria and South Africa, lives in countries where the agricultural sector share of GNP is about a third. And another quarter of the African population lives in countries which, on a group basis, have an agricultural GNP share of about 20 percent. That's a lot of variance, and one would expect that the role of agriculture in the economic growth process and in the economic process generally would be substantially different in these three groups.

It's interesting to ask the question, "How much does agriculture contribute to foreign exchange?" As you can see from Table 1, in all cases the contribution to foreign exchange earnings in these countries is substantially higher than the contribution to GNP. And even in countries where agricultural GNP is low, agriculture's contribution to foreign exchange is very high -- almost 50%.

I think this is an important way to look at agriculture's contribution to the economy because the GNP shares of agriculture can be very distorted, particularly in countries which have had an extended period of bad macro-economic policy, where agriculture, particularly tradable agriculture, has been discriminated against for a long period of time.

Table 1: Agriculture's Direct Contribution to African Growth Under Various Sector Share and Growth Rate Scenarios, Assuming a Target GDP Growth Rate of 5.0%¹

Share of agriculture in GDP by country group	Share of African population excluding Nigeria and S. Africa	Average share of agriculture in foreign exchange earnings, 1990 ¹	Average share of agriculture in GDP ²	15 Year Projection ³		
				Agricultural growth rate	Required non-agricultural sector growth rate	Agriculture's contribution to GDP growth
High ⁴	49	84.8	48.9			
			+15 Years:			
			36.6	3.0%	6.5	25.4
			42.3	4.0%	5.8	36.4
Medium ⁵	26	58.1	32.9			
			+15 Years:			
			24.6	3.0%	5.8	17.1
			28.5	4.0%	5.4	24.5
Low ⁶	24	42.5	21.5			
			+15 Years:			
			16.1	3.0%	5.5	11.2
			18.6	4.0%	5.3	16.0

¹Note: Does not include indirect contribution through linkage to other economic sectors.

²Note: Group averages are weighted by intragroup population shares.

³Based on: $Y' = \alpha Y'_A + (1-\alpha) Y'_N$ where Y' , Y'_A and Y'_N equal the growth rates of GDP, and the agriculture and non-agriculture components of GDP, respectively; and α is the geometric mean of the agriculture sector share of GDP during the 15 year period.

⁴High: Burundi, Central African Republic, Cote d'Ivoire, Ethiopia, Ghana, Mali, Mozambique, Sudan, Tanzania, Uganda.

⁵Medium: Benin, Burkina Faso, Chad, Madagascar, Malawi, Niger, Nigeria, Rwanda, Sierra Leone, Zaire, Togo.

⁶Low: Angola, Botswana, Cameroon, Congo, Gabon, Guinea, Kenya, Lesotho, Mauritania, Namibia, Senegal, Zambia, Zimbabwe.

Sources: World Bank, 1992a. World Bank, 1992b.

In these countries the share of agriculture in GNP falls, but because agriculture still has the strongest comparative advantage on an international trade basis, the contribution of agriculture to foreign exchange remains high, and so you get these rather odd configurations. This has implications for thinking about agriculture's contribution to growth. Foreign exchange is really a constraint if its shadow price is substantially higher than its official or market price. If the sector is already contributing a large share of foreign exchange, and if it does have dynamic comparative advantage at the margin, then we may be understating the role of agriculture in the economy in these lower share countries by using the GNP share measure.

The next part of this exercise is a simulation based on a target GNP growth rate of 5% compounded over 15 years. That's a pretty ambitious growth target, but it certainly is a growth rate that's been achieved in a number of developing countries. The second assumption will be that the agricultural sector grows in scenario one at 3% over that period, and in scenario two at 4% over that period. Dividing Africa into the same groups as shown in Table 1, and using a simple growth accounting equation, Table 2 shows the prospective contribution of the agricultural sector to growth in these scenarios and the necessary growth rate of the non-agricultural sector. Keep in mind that the non-agricultural sector includes much more than manufacturing. It includes a lot of services, where productivity does not grow very fast.

The burden of growth will fall on a relatively small part of the non-agricultural sector, which will have to grow much faster than these numbers in Table 2 indicate.

What is agriculture's contribution to economic growth during this fifteen year scenario? This number in Table 2 represents the minimum contribution that agriculture makes in the process, because it's simply a growth accounting contribution. In high agricultural GNP share countries the contribution ranges from a quarter to somewhat more than two-thirds of the whole growth process is accounted for by agriculture. In the lower share countries it's somewhat less. If we consider what many agree are the dynamic linkages between agriculture and the rest of the economy then these numbers must be substantially higher.

This is telling us that agriculture is strategic in the economies of most African countries but that we do have to differentiate. We have to recognize that agriculture is going to play different roles in different types of countries, that there's a great deal of diversity, even when we're talking about a simple thing such as how important is agriculture in African economies.

In Table 3, I've divided Africa into three different agri-ecological zones, with the help of Tom Tomich a colleague at HIID. This is based on some earlier work by David Seckler and John LaBore, using a somewhat different technique than what the FAO has used. It employs an analysis of water availability and water stress and related to agri-climatic need, and it was also based on some evaluation of soils.

A little more than 27% of the non-Nigerian population is in the humid region, almost half of the Sub-Saharan population if we include Nigeria. Obviously, within each of these countries there are other agri-ecological zones. The mixed agri-ecological zone region where there's no one dominant

zone, represents a little more than half the non-Nigerian population, or about 40% of the total African population living. A substantially small portion of the population lives in the dry zone of Africa.

Table 2 also shows food production per capita in 1988-90 relative to a base period of 197-81. In the humid zone there has been a fall in food production per capita; in the mixed zone the decline was less severe. Food production in the dry zone was also not able to keep up with population growth. I'll return to this later.

The share of root crops and plantains in the diets of African countries is also displayed in Table 2. This dimension constitutes a strategic difference in the food economies with Africa. In the humid zone almost 50% of food consumption comes from root crops and plantains, and if we had added another, tubers, it would have been even higher. In the mixed zone it's less than 20%, and in the dry zone the role of root crops and plantains is negligible.

This raises lots of questions about research priorities and about research potential. It also calls attention to issues about price formation, about the relative importance of tradable and non-tradable foods in the economy. There's clearly a tremendous amount of differentiation in Africa along this dimension.

The final measure I want to discuss from Table 2 is cereal yield variability. This is an average of the deviations of the reported cereal yields for each of these countries over a twenty-year period; it's basically a co-efficient of variation: the higher it is the more instability there is. You can see that there's a lot of variation within each of these regions, so I reformulated the groupings based not on the agri-ecological zone criteria but on the cereal yield variability criteria. This results in a new regionalization of African countries shown in Table 3. Taking the low variability group and setting it to 100 as a base, we can see that medium variability countries have cereal yields that are more than twice the variance of the low variability set, and the high variability countries it is substantially more.

The pattern and degree of cereal yields variability is not homogeneous across Africa; and that certainly is absolutely strategic regarding farmers' perceptions about investment, about the nature of market failures, about the relative importance of many policies that we know influence agriculture and agricultural development.

In constructing Table 4 I was curious to see whether Southeast Asia -- I know you don't like these comparisons, but I'm going to do it anyway. Is Southeast Asia substantially different in terms of its cereal yield variability? I took the low cereal yield variability zone in Africa, set it equal to 100, and then compared it with Southeast Asia yield variability in the same time period -- of course the rice share of food production is much larger in Southeast Asia, but the maize share is not small. In the Philippines, for instance, maize is about 45% of the level of rice production.

Table 2: Africa: Food Production Characteristics by Agro-Climatic Zone

	POPULATION (% of Total ¹) 1989		FOOD PRODUCTION <i>Per Capita</i> , 1988/90 1979/81=100	ROOTS & PLANTAINS in TOTAL CALORIES (%) ²	CEREALS YIELD VARIABILITY 1970-1990 ³
	<i>Excluding Nigeria</i>	<i>Including Nigeria</i>			
HUMID SSA	27.8	45.1			
Congo			92.1	45.2	0.16
Zaire			96.6	61.3	0.03
Gabon			81.3	50.8	0.06
Central African Rep.			95.1	50.6	0.11
Nigeria			112.8	30.8	0.11
Angola			80.1	32.5	
Rwanda			76.0	44.3	0.05
Burundi			94.7	22.7	0.06
Uganda			92.3	45.3	0.21
Côte d'Ivoire			98.0	34.5	0.10
Sierra Leone			88.0	7.0	0.07
Liberia			86.2	23.3	0.02
Gambia			91.2	1.3	0.15
Guinea-Bissau			101.8		0.13
AVERAGE			91.9	44.7	0.08
MIXED SSA	55.2	41.9			
Senegal			103.6	0.5	0.19
Tanzania			88.3	29.7	0.08
Kenya			106.5	9.1	0.11
Guinea			87.1	23.8	0.06
Madagascar			90.6	19.8	0.04
Mozambique			85.5	41.8	0.10
Zambia			98.4	4.8	0.15
Cameroon			90.0	24.6	0.07
Malawi			82.8	6.4	0.08
Ghana			109.2	49.6	0.22
Ethiopia			85.1	3.1	0.11
Zimbabwe			95.6	1.4	0.29
Togo			97.8	29.4	0.09
Benin			118.2	35.6	0.10
AVERAGE			95.6	17.8	0.12
DRY SSA	17.1	13.0			
Swaziland			92.7	0.7	0.29
Lesotho			81.0	0.6	0.29
Botswana			78.9	1.0	0.62
Namibia			94.7		
Mali			98.1	2.7	0.13
Mauritania			89.2	0.4	0.23
Burkina Faso			114.4	1.8	0.08
Sudan			75.4	1.8	0.19
Chad			97.2	16.2	0.14
Niger			80.3	4.0	0.13
AVERAGE			90.2	3.3	0.17

¹Excludes South Africa. ²Group averages are weighted by intragroup population shares. ³As defined in Table 8.
Sources: World Bank, 1992b. Food and Agricultural Organization of the United Nations, 1987.

Food and Agricultural Organization of the United Nations, 1980. William K. Jaeger, 1992.

Table 3: Cereals Yield Variability in Africa

	POPULATION (% of Total ¹) 1989		CEREALS YIELD VARIABILITY 1970-90 ²	INDEX OF CEREALS YIELD VARIABILITY 1970-90 ³
	<i>Excluding Nigeria</i>	<i>Including Nigeria</i>		
LOW VARIABILITY	36.4	27.4		
Liberia			0.015	28.0
Zaire			0.026	48.0
Madagascar			0.039	71.3
Rwanda			0.051	93.2
Guinea			0.058	105.7
Burundi			0.059	106.7
Gabon			0.062	113.0
Cameroon			0.070	127.2
Sierra Leone			0.074	134.0
Tanzania			0.077	139.3
Malawi			0.079	144.4
Burkina Faso			0.082	148.3
AVERAGE			0.055	100.0
MEDIUM VARIABILITY	41.2	55.7		
Togo			0.093	169.4
Cote d'Ivoire			0.098	177.7
Mozambique			0.102	184.5
Benin			0.102	185.0
Nigeria			0.112	203.5
Central African Rep.			0.112	203.8
Kenya			0.114	207.6
Ethiopia			0.114	207.9
Mali			0.130	237.1
Guinea-Bissau			0.133	240.8
Niger			0.134	243.4
Chad			0.141	256.8
Zambia			0.150	273.1
Gambia			0.152	275.8
Congo			0.159	288.4
AVERAGE			0.115	208.2
HIGH VARIABILITY	22.4	16.9		
Senegal			0.189	344.2
Sudan			0.192	349.7
Uganda			0.205	373.3
Ghana			0.216	392.9
Mauritania			0.230	417.4
Zimbabwe			0.287	521.0
Lesotho			0.291	529.6
Swaziland			0.294	535.0
Botswana			0.616	1118.8
AVERAGE			0.222	402.7

¹Excludes South Africa. ²Standard deviation of residuals of logged cereal yields from trend. Group averages are weighted by intragroup population shares.

³Index based on Low Variability group average =100.

Sources: World Bank, 1992b. William K. Jaeger, 1992.

Table 4: Cereals Yield Variability

	CROP	CEREALS YIELD VARIABILITY 1970-90 ¹	INDEX OF CEREALS YIELD VARIABILITY 1970-90 ²
Indonesia	Rice	0.054	98.3
	Maize	0.117	213.0
Malaysia	Rice	0.113	205.3
Philippines	Rice	0.059	106.6
	Maize	0.032	58.2
Thailand	Rice	0.049	89.7
	Maize	0.127	230.2
Low Variability Africa	Cereals	0.055	100.0
Medium Variability Africa	Cereals	0.115	208.2
High Variability Africa	Cereals	0.222	402.7

¹Standard deviation of residuals of logged cereal yields from trend. African groupings are as outlined in Table 5, with group averages weighted by intragroup population shares.

²Index based on African Low Variability group average =100.

Sources: Food and Agriculture Organization of the U.N., 1990. William K. Jaeger, 1992.

You can see that for some Southeast Asian countries and some commodities there is a variability of cereal yields that is double that of the low zone in Africa. For some commodities cereal yields in Southeast Asia are substantially more stable. For rice in Indonesia, for example, it's about the same as the low zone.

In Figure 1 I've taken a number of African countries, measured food production growth (not per capita) on one axis and food production growth per capita on the other. A number of countries haven't done all that badly in terms of food production growth. But most of them, even with a pretty good record of food production growth have a rather dismal record of food production growth per capita. If Africa over the past decade had the population growth rates that were prevalent in Southeast Asia, and holding the food production growth record constant, African countries would have performed along the line shown in the graph. This is a much more encouraging picture. Of course the food production growth record is influenced by population growth, although the statistical correlation between rural population growth in Africa and food production growth is not strong. Nevertheless, this graph calls attention to the difficult challenge agriculture posed by rapid population growth.

Finally, in Figure 2 I've shown countries where over the past decade there has been a real exchange rate (RER) devaluation. This exchange rate is the price of non-tradables over the price of tradables, the conventional IMF way of measuring real exchange rates (RER). What's measured on the horizontal axis of the graph is the ratio of the recent RER to one in the late 1970's. A ratio less than one indicates a real devaluation. On the other axis is a measure of the change in agricultural domestic terms of trade, the price level of the agricultural sector relative to that of the non-agricultural sector. This is calculated from data presented in World Bank World Tables.

We expect that if agriculture is tradable in general, and that if you had a real devaluation, then the domestic terms of trade would improve for agriculture. This relationship is not clearly revealed, however, in Figure 2. This raises a number of questions about the degree to which agriculture is, in fact, tradable in many African countries. The lack of a simple relationship in Figure 2 further suggests the possibility that RER devaluations have been accompanied by trade and domestic marketing policy reforms that have had a countervailing impact on domestic agricultural prices.

I'm going to end this presentation here and ask Steve Block to introduce you to some of the work he's been doing on agricultural productivity in Africa.

Figure 1: African Food Production Growth Per Rural Population, 1980-89

Figure 2: Real Exchange Rate (RER) Devaluation

Block: There are two themes from this morning's conversation that are particularly relevant. One was: don't generalize about Sub-Saharan Africa as a whole; and the other one was Rashid's point about not using the macro data sets because they're highly inaccurate. Well, I'm going to go ahead and generalize about Sub-Saharan Africa using the macro-economic data sets.

I'm going to present the preliminary results of a cross-country productivity study that I've been doing. My hope is to stimulate discussion, I certainly don't have any pretension of making a definitive statement about what's happening in African agriculture. To put the work in the context of the agricultural transformation I would just remind you that in Peter Timmer's speech in the Winrock book, for example, he identifies four stages of transformation, the first of which is rapid and sustained increase in agricultural productivity. So if the question is whether or not there is an agricultural transformation happening in Africa, it seems to me the first thing to do is measure productivity change in agriculture.

I agree with the discussion that the real answers are probably best found on the national level, but I think there is still a need to generalize. My work is at a more aggregate level. It's not all just about Sub-Saharan Africa, I will also present results that disaggregate across five agri-ecological zones within the continent.

In general this fits in a tradition in the economics literature of doing cross-country productivity comparisons. The problem has been that literature has by and large ignored Africa. So, I'm trying to fill that gap.

Data quality is obviously a serious concern. There's a small piece of philosophy that I brought to this problem. I was working in Kenya last year, and my friend Dr. Gitu gave me a piece of advice. He said, Block, you have to bold with the data. So, I have tried to be bold with this data. I have used the FAO data, which is the only historical cross-country data set that's available. I think we can all agree that in general it's probably poor quality data as regards a given country in a given year.

One concern in particular that's come up in previous conversations are the conflicts between the story that comes out of the macro data as it's typically treated, and what some people are seeing in the micro data, people who are doing farming systems research.

The main point that I want to make about the aggregate data in general is that it tends to be made much worse than it really is by the way it is typically treated by people doing cross-country studies. It's a problem of aggregation that exists at two levels. The first is that we need to be able to add across commodities within a given country. And then bigger problems come in at the level of being able to compare aggregate output cross countries. We need to have aggregate output numbers that are in comparable units.

The typical approach, and what you'd see, for example if you look in the statistical appendix of the World Development Report, is to use agricultural value added in constant dollars. They calculate the agricultural value added, first by using the domestic prices of the different commodities

in the local currencies so that they can create values, and then add them together to get an aggregate value added within the country. Then they use the official exchange rates to convert those value added terms into comparable units.

Both of those processes introduce tremendous bias into the resulting aggregate because the price data themselves are often fixed by the government - either that, or they're missing. More importantly, though the official exchange rates are the real serious problem because as we all know the foreign exchange markets in Sub-Saharan Africa tended to be in a great degree of disequilibrium, particularly in the 1970s, and then there was, with structural adjustment, a large degree of nominal devaluation in the early 1980s.

Well this goes right into those aggregate figures, and if you try to do productivity measurements based on that, it goes right into the productivity measurement as a huge source of bias.

Now, I've taken a somewhat different approach to aggregating the production data, and I think it actually constitutes a first step towards reconciling the conflict between the macro and the micro stories that are coming out of the data.

The approach that I've taken is known as the wheat units approach, and it comes from Hayami and Ruttan's book on agricultural development.²

Let me just briefly describe the wheat unit approach. The idea is to create a physical aggregate based just on the quantities of the commodities. The way that you're able to add across commodities like this is by applying a fixed set of relative prices that come out of a set of reference countries, and it's each commodity's price relative to wheat.

So, for example if a ton of soy beans costs twice as much as a ton of wheat in the reference country it would have a wheat relative price of two, and if there were ten tons of soy beans in the country we're looking at, then we would say that's equivalent to twenty tons of wheat, and we can just add all the commodities together as if they were wheat.

In the end you get one number for aggregate output in the country. It reflects the total output of both the agricultural and livestock sectors, and it doesn't involve exchange rates. It's a physical aggregate that's comparable across countries.

So I created what's essentially a new output data set based on the FAO data. I aggregated over forty commodities within 39 countries using the wheat units approach, and I did this at six separate points in time. So, there are six cross-sections at five year intervals from 1963 to 1968, which is the type of thing you need to do productivity measurement.

² Yujiro Hayami and Vernon Ruttan. 1985. *Agricultural Development: An International Perspective*. Baltimore: Johns Hopkins University Press).

Table 5 shows the growth in the aggregate output, and you can see that I've broken it down into five regions, and then there's the average for Sub-Saharan Africa. You can see that there's quite a lot of variation across regions and over time in this aggregate output growth.

But there are some general patterns. We see a decline in the late 1960s, and the growth rates don't increase again until the early 1980s. East Africa is an exception to this trend, but that general pattern persists. Now, if you compare this to what you would find in the World Development Report, which is where most people would tend to look for this type of information, you'd see that the average growth rates there and in the wheat unit's data is about the same: a little over 2% a year for the entire period from 1963 to 1988. However, the World Development Report will tell you that agriculture in Africa was growing more slowly in the 1980s than it was in the previous decades; and the wheat units would seem to suggest just the opposite: that the aggregate growth rate has gone up from 2% in the '78-'83 period to over 3% in the '83-'88 period.

Table 5: Average Annual Growth Rates of Agricultural Output (%/yr in Wheat Units), n=39

	<u>1963/68</u>	<u>1968/73</u>	<u>1973/78</u>	<u>1978/83</u>	<u>1983/88</u>	<u>1963/88</u>
SSA	2.9	1.9	1.1	2.1	3.2	2.2
Sahel	2.3	1.1	1.1	2.0	1.8	1.7
West	2.1	1.1	0.2	2.6	5.7	2.3
Central	2.7	2.9	1.1	1.9	2.5	2.2
East	4.6	2.5	3.8	3.1	2.9	3.4
Southern	3.4	3.1	0.1	0.4	2.4	1.9

You can decompose this aggregate growth into various component parts. What I've done, for example, is broken it into the component that was contributed by increases in the per hectare yields of the individual commodities versus the contribution to growth that comes from expanding the area under cultivation, or shifting the crop mix around. If you move to a more valuable crop you'll tend to increase the aggregate number.

It turns out that for Sub-Saharan Africa as a whole over this 25 year period, 75% of the growth in aggregate output came from area expansion and changing crop mix, and 25% came just from specific increases in the output per hectare. This morning somebody raised the question of whether substitution across commodities constituted growth, and in fact it accounts for most of the growth over the last 25 years.

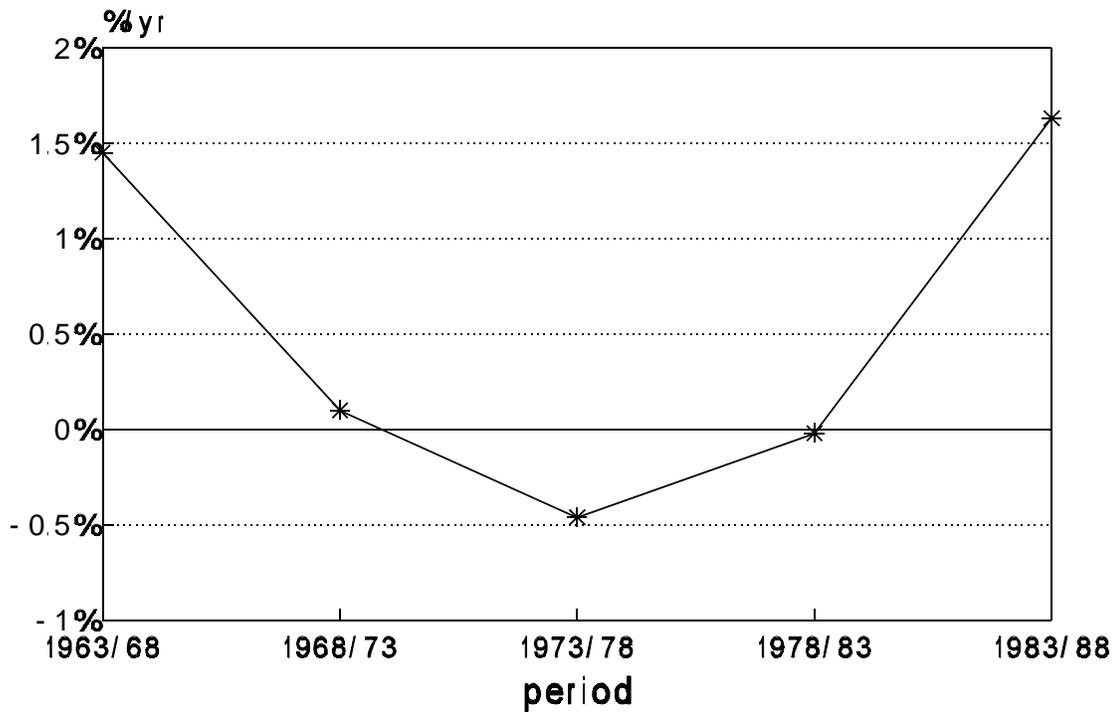
Again, we see significant variation across regions. The highest share of productivity in aggregate growth was in East Africa, where productivity in this sense accounted for 55% of the total growth. Whereas in Southern Africa, which had the lowest contribution of productivity to total

growth, it was actually -7% So all the output growth, in fact more than all of the growth in Southern Africa was coming from area expansion and changes in crop mix. I've used these new output data to do various types of productivity measurements, both on the aggregate and the regional levels.

There are two ways to think about productivity from a methodological perspective. One of them is known as total factor productivity analysis, or TFP. The most intuitive way to think about TFP growth is that it's the percentage growth in output that's not accounted for by growth in inputs. So, for example if you see over a given period a 5% increase in output and you know that the measured inputs went up by 3%, that difference of 2% that's unexplained is total factor productivity growth. You can also think of it as a neutral shift upwards in the production function.

Figure 3 shows the results of these TFP measures for successive five year periods. Now, this is the aggregate for 39 countries, and you can see that in the mid-1960s, TFP was growing by about 1.4% a year. In other words output was going up by 1.4% a year faster than the increase in the quantities of inputs that were going into agriculture.

Figure 3: TFP Growth: Output in Wheat Units



Following that initial period, you see fifteen years really of virtual stagnation in terms of agricultural productivity growth. In fact this data would suggest a decay of productivity in the mid-1970s. But what really surprised me when I did this analysis was the strong recovery of productivity in African agriculture during the mid-1980s. You can see the last segment there, from 1983 to 1988

goes up quite dramatically, from about 0% to 1.6% a year. I think this is somewhat closer to the story that comes out of the micro-data sets that people talk about in very specific areas. But it is contrary to what has been the popular view of African agriculture.

I've done TFP measurements for these separate regions as well, and in each case I've compared the region with the average for the full sample. You can see in Figure 4 that there's quite a lot of variation across regions relative to the mean.

If you look for example at Southern and East Africa and you compare them, you can see that both of those regions were well above average productivity growth in the earlier period, and now in the last periods, or subsequent to that in Southern Africa's case, they're both significantly below the mean for the rest of the continent.

I'd be grateful if people here could help to explain some of these changes across regions. For example, if you look at East Africa and you see from the mid-1960s until the early 1980s, productivity growth is quite robust. My sense would be that the type of thing that would explain that would be the success of the maize research and extension programs in Kenya in particular. That's the type of technical change that we were talking about this morning, and that's also one of the things that will tend to drive total factor productivity change. Table 6 summarizes these growth rates by region of total factor productivity growth in the different time periods.

Figure 4: TFP Growth Rates by Region

Table 6: Region-Specific Agricultural TFP Growth Rates (%/yr)

	<u>1963/68</u>	<u>1968/73</u>	<u>1973/78</u>	<u>1978/83</u>	<u>1983/88</u>	<u>1963/88</u>
East	2.98	0.74	1.20	0.44	0.65	1.20
West	0.75	-0.35	-1.04	0.43	3.35	0.63
Sahel	0.45	-2.48	-0.82	0.17	1.76	-0.19
Central	1.40	0.34	-.04	0.46	1.85	0.80
Southern	1.36	1.88	-1.25	-1.47	0.34	0.16
SSA	1.45	0.10	-0.46	-0.02	1.63	0.54

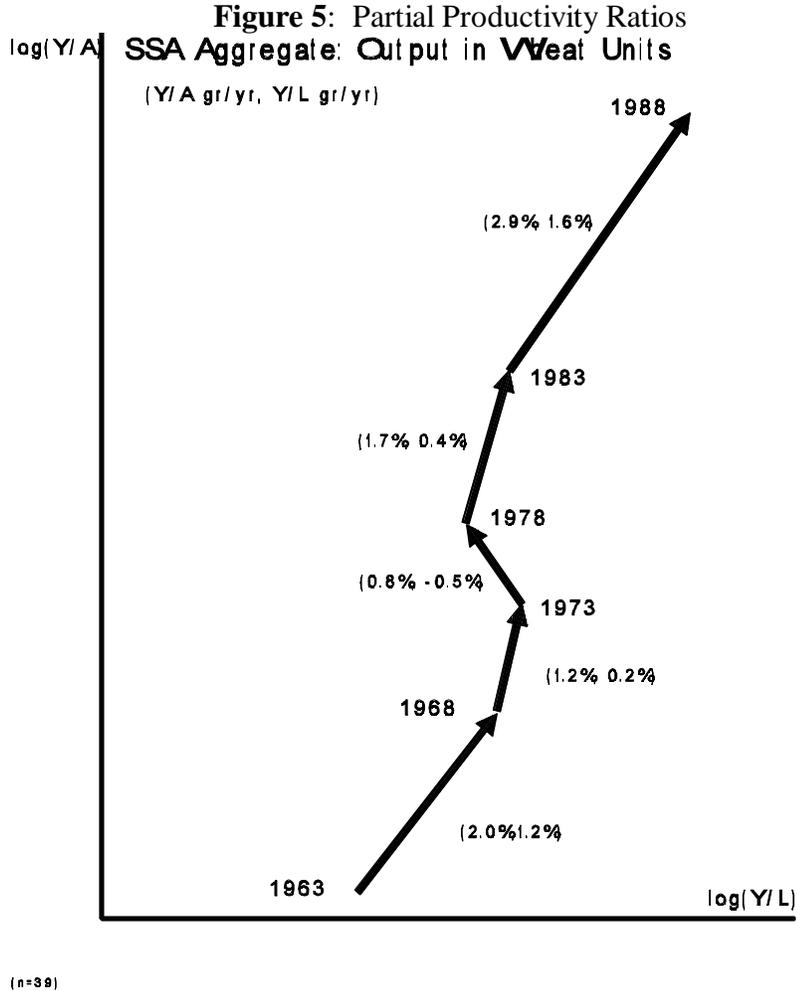
It's the case that East Africa had the highest average, which was about 1.2%, and the Sahel had the lowest average over this period, which was slightly negative. Part of the explanation for that I think would be the difference in the food systems between those regions. The Sahelian countries are dependent on sorghum and millet, and, as was discussed this morning, the technological breakthroughs for those commodities really have not gotten out into the field.

One thing I have to point out is that I did not explicitly control for weather. But when I say 1968, for example, what I really mean is the five-year average from 1966 to 1970. All of the data are calculated as five-year averages to iron out the year-to-year variation that one would see if you just looked at individual years.

Now, TFP growth is nice but it has the problem of bunching all the inputs together and it doesn't really tell you anything about specific changes in land and labor productivity. The other type of productivity measurement that I want to present is known as partial productivity ratio analysis. The partial productivity ratios are simply the average output per worker in agriculture, and the average output per hectare. You can trace these changes over time and to see how they change relative to one another. In fact you wind up with a graph (Figure 5) that works exactly the same way as the expansion paths that Dick showed in his presentation.

The vertical axis is output per hectare, and so if you see movements to the north, that means that yield was increasing. The magnitude of the arrow tells you the rate of increase in yield, and movements to the east would reflect increases in output per worker. The numbers in the parentheses next to each arrow reflect the average growth rate of output per acre and output per worker in each of those periods.

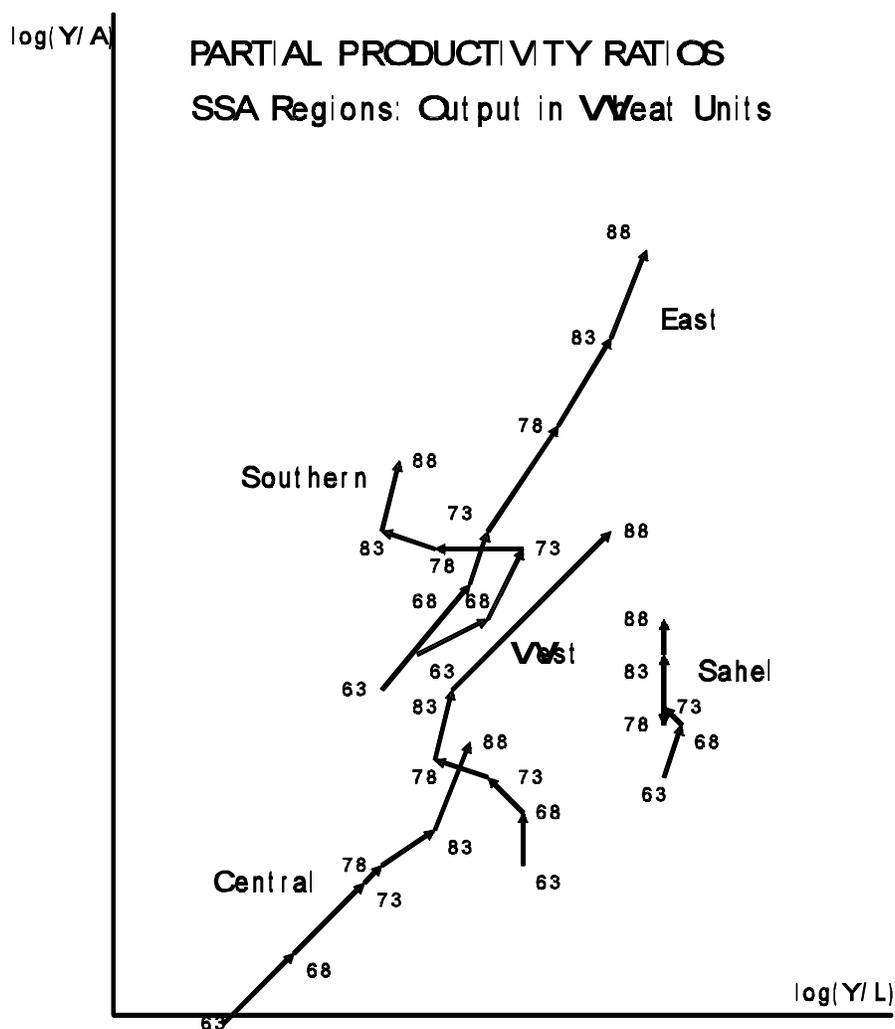
These results tell a very similar story in general to the TFP, which is that the movements were to the northeast in the earlier and later periods, which is basically what you want to see. But in the middle periods you see the arrows are shorter, which means the rate of increase was slower, and in fact from '73 to '78 labor productivity actually declined by .5% a year.



Now, the way this works again with the 45 degree line, is that if an arrow goes steeper than the 45 degree line, it means that output per hectare was increasing more rapidly than output per worker. That's the case in every period for Sub-Saharan Africa. And if you average over the full 25-year period it's the case that output per worker went up at almost three times the rate of output per worker. Output per hectare grew at 1.6% a year on average while output per worker grew at .6%. This goes back to some of the demographics because you had a rapidly increasing labor force.

Figure 6 shows these partial productivity paths on the regional level. You can see that East Africa, for example, has a fairly robust path to the northeast throughout all of the periods. The second period was a little slower. In the case of East Africa the growth was primarily in output per hectare rather than labor. You can also see that Southern and West African countries suffered a big hit to productivity, particularly as regards labor productivity, generally from the late 1960's through the 1970s.

Figure 6: Partial Productivity Ratios



By the final period, the 1983 to 1988 period, the last segment of these arrows, all the regions, are in recovery, moving to the northeast, with the minor exception of the Sahel, which is increasing its yield somewhat slowly, but is having no change in its labor productivity.

I'll stop with just a brief summary. In terms of productivity growth what these results suggest is a lot of regional diversity, but a fairly clear general pattern, which was one of stagnation for fifteen years surrounding the 1970s, followed by a fairly substantial recovery of agricultural productivity in the mid-1980s.

What does this tell us about the agricultural transformation? Is Africa entering the first phase of an agricultural transformation? Well, on the aggregate level these results would tend to suggest that there's some reason to think that it is entering the first phase of an agricultural transformation. We see this significant recovery in the 1980s.

There are some caveats. It's recovery from a very low level of productivity for a reasonably long period before that, and the progress is still somewhat moderate.

I still think that the question is best addressed on the regional and perhaps national levels. If we look at the regional results we see that there's actually less consistency to the productivity gains. We see, for example, that East and Southern Africa were the strongest performers in terms of productivity growth, but they dropped off, and now in the last period they were below average.

So, this raises, I think a concern for the sustainability for these productivity increases. What we're really seeing now, at least in my results, is a return to the productivity growth rates that were typical the last 1960s. If we had had this discussion in 1970 and asked the question of whether Africa is entering an agricultural transformation, we might have said, Yes, productivity is growing at 1.5% a year. Yet, clearly, the next 15 years would have disproved that point.

So, my final thought is that we really can't project from these findings. There's some reason for hope. But we just can't project whether or not these gains will be sustained over the next 10- to 20-year period, which is probably what would be necessary to really have a sustained and robust agricultural transformation.

Matlon: I have a question of clarification, and then once I have the response I would like to ask a more substantive question. If you could explain once again exactly the calculations to arrive at the wheat unit measures of productivity. Once you've answered that, then I'd like to pose the question.

Spencer: Could you also explain a bit more why that measure is leading to a difference from the normal aggregate? I wasn't quite clear on what is the driving factor in that?

Block: Was that your question as well?

Spencer: No, but it was linked to that.

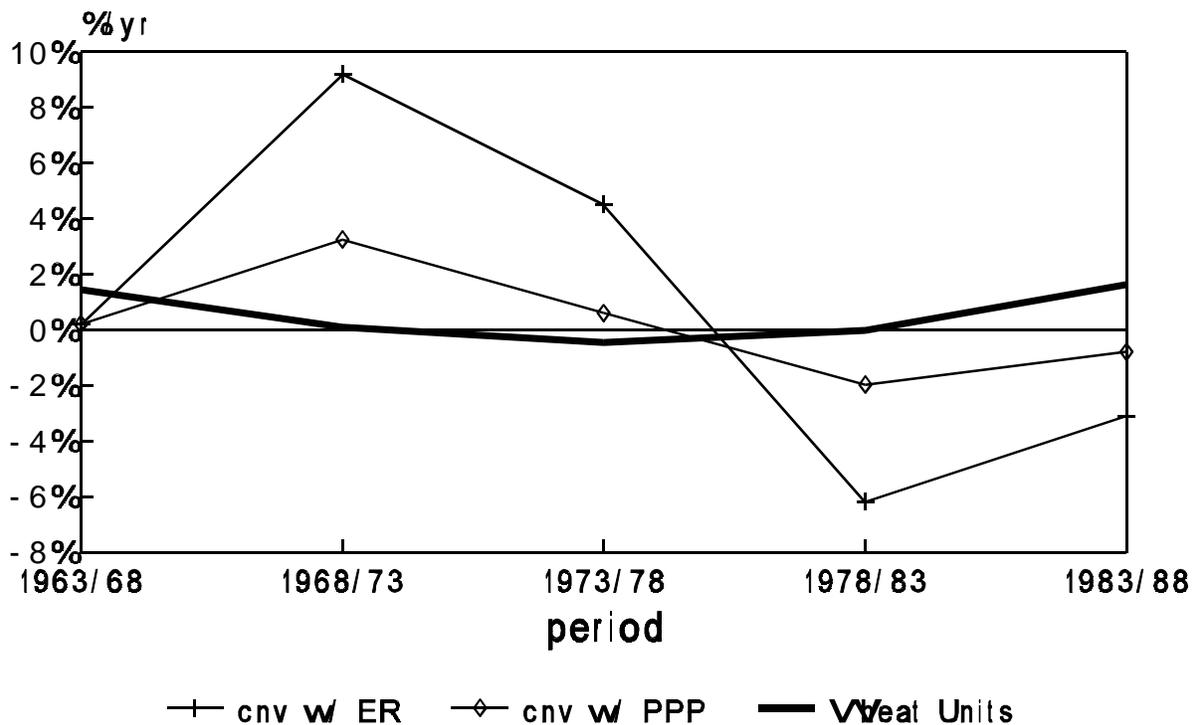
Block: Well, the wheat units approach is imperfect, but I think it's better than the alternatives. The object is to look at the quantity of all the different commodities, or whichever ones you choose, but I picked forty commodities in agriculture and livestock within a given country, and to try to figure out a way to add them together without resorting to price data which is often unavailable.

The approach that Hayami and Ruttan took in their well-known book was to look at the relative price of each commodity to wheat in a set of three reference countries, and to apply those relative prices to the quantities of different commodities within the countries that they were analyzing. I gave the example of a wheat relative price of two for soy beans, if it was the case in the reference country that a ton of soy beans cost twice as much as a ton of wheat. For a country that grew ten tons of soy beans you would use that relative price of two and say that it was equivalent to twenty tons of wheat, and then you could add everything together in those comparable units.

To answer Dunstan's question about why this is different, it has to do with the exchange rates that are used to translate agricultural value added from local currencies into comparable units.

I actually have a graph that I didn't show you before. Figure 7 illustrates TFP growth rates with alternative output measures, there's one path, showing the TFP growth rates that results from taking the value added figures in local currency, and converting them with the official exchange rates, as is typically done by say the World Bank in the data that they've published. Well, if you were to use those as the output aggregates and then calculated total factor productivity change over these periods it would look like it was way high in the late 1960s, early 1970s, and then comes crashing down in the last 1970s and early 1980s. They're both really unrealistic extremes.

Figure 7: Alternative TFP Growth Estimates



If you were to compare it with the last graph in your hand-out which shows the path of nominal exchange rate devaluation, you'll see that nominal exchange rates are devalued, which means the line is going up at just exactly the same time as the TFP measurements that are based on those exchange rates coming down. This exchange rate path strongly affects the agricultural value added when you translate it into dollars. This is a particularly severe problem for Sub-Saharan Africa because of the degree of disequilibrium in the foreign exchange markets. So, I think that the wheat

units are a better alternative, even though there are some problems intrinsic to the wheat units themselves.

Matlon: Then if I could ask my question, that was precisely what I had feared. What's happening to wheat prices over this period, world wheat prices? They've declined dramatically. Once you are trying to show the equivalent in terms of wheat that would have been purchasable by the value of the local products that have been produced, would give you an increase in productivity because the wheat price has been dropping, particularly dramatically following the mid-seventies.

Goldman: He's only using the wheat prices once. What he's done is solve the apples-orange problem in the base year, so that we get a joint commodity based on these wheat units. After that it's all based on physical changes. You don't keep using the wheat price every year to get this thing. What you're trying to do is avoid the exchange rate problem of valuing everything in terms of local currency, then converting to dollars to get to apples and oranges.

It avoids that problem by saying let's evaluate everything in terms of wheat units in one base year. Then all the change from that base year is physical output. It doesn't depend on price changes.

It's true that it's not describing the purchasing power, internationally, of this bundle? Because when you get to the end of the period the purchasing power is going to be different because the prices are different.

What it does help you do is clarify whether there have been physical improvements in agriculture, which is a very important question. It's sort of separating the physical side of aggregate agriculture from the value side of aggregate agriculture over time.

Monke: Now, that's very fine, but then the thing we have to be careful about at the end of the day is when we interpret the results of whatever we find about productivity and change, we have to recognize that these calculations don't allow for changing prices, and at the end of the day then we have to ask whether we really seeing agricultural transformation? Or are we seeing a price response?

Is Africa entering a period of agricultural transformation because we seem to see positive factor productivity growth, and does that show that there's been some kind of significant technological change in Africa, on average? Or, are we seeing instead the effects of rationalization of prices, of very substantial amounts of price response, of changes in the degree of discrimination against agriculture in the 1970s as opposed to the 1980s?

That's where I think prices have to come back into our thinking in interpreting what these kind of results. It may be that prices explain the results that we see. But in terms of the actual calculations, prices are left completely out.

Ehui: I have two questions, one for Steve and one for Dick. We did some work on productivity at a micro-level, using that approach to look at system issues. An interesting thing that

we, that is Spencer and I, came out with is that when you look to the total factor productivity approach, and just interpret it on the basis of the output and the normal inputs -- I'm talking about the factors of production used -- the result may not actually reflect environmental degradation. The interpretation of your statistics, will probably be different if you incorporate in resource flows, resource degradation, the resource stock and so on.

The challenge is for economists to try and see how changes in the resource stock can be incorporated into your TFP measures. I don't know if you can reflect again on your studies, and try to see how that will change the interpretation.

Block: I think you make a good point. There's some work by John Lynam and some other people that have addressed that exact question and I think it's a good point. I think it's a point that in practice almost has to be addressed the way you did, which is on a micro level, because when you try to have a macro level aggregate, historical data for anything that would accurately reflect what you're talking about, they really don't exist.

Your point is very well taken and it would tend to lower the TFP figures that I've come up with. I don't know how it would change them relative from one period to another. If the degradation got worse at an increasing rate in later periods, it might flatten out that U-shaped curve a little bit. But I think the general effect would just be to pull the whole curve down. I was trying to be optimistic. But that's a very good point.

Ehui: The second question is for Dick. First of all, Dick presented results on the variability of crop yields. I'm not sure what the implication of that table was, because in terms of the information for people policy-makers, is the variation in crop yield actually what matters for policy-makers, or is it income variability?

The reason why I'm asking that is because you have a situation in the highlands and the semi-arid zone where you have full integration of crops and livestock. You can't look at crop yield alone without addressing the livestock aspect of it, which is actually stabilizing a lot of the variability in terms of income. It can be misleading to look at crop yield, or production variability without looking at the total system.

Goldman: That's a good point. I took the numbers on cereal yield simply because those are what we had for time series on an aggregate basis over a large number of countries, and also because variability and risk have been singled out as being a very significant factor in explaining the behavior of African agriculturalists. I was curious to see whether based on that measure alone, the cereals yield variability, whether there was a substantial amount of differentiation within Africa.

All I can say is on that measure of variability it's clear that the issue is not homogeneous across Africa. I'm sure that going to the next step and asking, what is the implication of variability on farm behavior, on aggregate investment, on research strategies, that gets much more complicated and I'm sure one has to go into farming systems to begin to understand how agricultural households

have coped with this. Presumably they've coped with it in a way to dampen the impact of any one dimension of variability. Nevertheless most people seem to think that risk and variability remain an important issue and are the source of substantial market failure.

The implication of the data that I presented is that it may be a substantially less of a market failure in some regions of Africa than in other regions of Africa.

Dapaah: I think in the morning I raised the issue of methodology and interpretation, and from the presentation I think this whole issue has come up again.

I might say that we have used this wheat equivalent, not to try to explain past performances, but to look at the demand and supply balance up to the year 2000 in Ghana. So, we've used that methodology. Of course the interpretation will be different because the objective was different.

From the policy-makers point of view, I would like to find out if the various periods indicate significant differences between the objectives of policy-makers.

For example, in most of our countries the policy-makers would like to see farmers produce to help feed the nation; they'd like to see them produce to help reduce the balance of payment deficit; or to develop agriculture for the benefit of the urban dwellers or to develop industry.

I believe that if you ask the farmer, then his main objective would be to try to make a decent living out of agriculture. So profitability becomes a very, very important issue from this point of view.

So, I'd like to know if it would be possible to relate the various time periods to opportunities for farmers to make more profitable investment. Is there information on better coordination within those various policies? What I'm trying to do is to see if the policy-maker can relate to others' mathematical presentations in terms of better coordination in agricultural policy; in terms of agricultural education and research; in terms of the production process itself.

Are there new ways of encouraging the farmer himself to invest in agriculture. Traditionally what has happened is that people in the capitals decide to build a road. Now, whether the farmers need that road or not, it's a decision they have been taking in the capital. We are trying to see if we can get the farmers themselves to identify what priorities are, and if that will improve the investment capacity for more productive and more profitable production by the farmer.

Block: What I can do, and this is only a very partial response, is to generalize about the types of things that you were mentioning as creating incentives for agriculture to be profitable and for farmers to invest, in terms of the way they are represented by various indicators of policy interventions.

For example the last page of the hand-out shows some graphs from a report by William Jaeger on real and nominal protection coefficients over time. These are measures of the taxation of agriculture relative to border prices. When the coefficient is below one it means that the domestic price was less than the border price, which reflects a tax on agricultural producers. If we can use this to summarize the types of things you were talking about, there's not really a very strong pattern over the earlier periods. Yet, the rate of taxation goes down very rapidly after 1983. You can see that the real and nominal protection co-efficient go above one. It's also the case that that's the period in which I had total factor productivity increasing. It could be a response to more supportive policy environment, and perhaps a greater potential for profitability in agriculture in which farmers might intensify their management practices, might have investible resources, and see a reason for investing in their own production units.

That wasn't the case in the earlier periods when agriculture was more heavily taxed. A similar set of relationships is apparent when you look at the domestic terms of trade, which summarize these relative prices of agriculture to non-agriculture. In my calculation of those relative prices, they tend to move in favor of the agricultural sector at the same time as the output per worker goes up. If you use those terms of trade as a price and you multiply it by the quantity of output per worker, the product goes up about 23% from the late Seventies to the late Eighties.

That might be a good sign, but it's not a real tight answer to your question.

Ikpi: I have two simple questions. One to Steve, and the other to Dick.

I don't know if I heard you right. When you said increase in total food output is 75% due to crop substitution.

Block: It's a combination. It's not just food production. It's all of agriculture in the aggregate across all the countries over the whole 25 years so it's a level of generalization that we all eschew. But 75% of the growth in that aggregate was a result of some combination of increasing area under cultivation, and changing the crop mix among those commodities.

Ikpi: So, what did you arrive at as the conclusion about agricultural transformation from that figure?

Block: Well, I didn't draw a direct conclusion from that figure. It was an observation about what's driving the growth. I think it's actually an open subject to debate, in fact one which came up this morning as to whether growth due to substitution as opposed to growth due purely to productivity increases, constitutes what we need for the first phase of the transformation. I would throw that question out for discussion rather than trying to answer it myself.

Then the other question for Dick is on the table on countries with real devaluations. From what you got there, how have you interpreted these real devaluations in those eight countries as effecting their own agricultural transformation?

Goldman: I haven't really interpreted that. What I wanted to do was simply see if there is any kind of gross statistical relationship between real devaluations over time in the 1980s on the one hand, and relative price relationships that face the agricultural sector on the other. The theory of structural adjustment that if you have a real devaluation, tradable prices domestically will rise relative to non-tradable prices. The next step usually is to make an assumption that the agricultural sector is generally more tradable than the non-agricultural sector. If you put those two things together you would expect that a real devaluation at the macro level should result in an improvement in the domestic terms of trade for agriculture, even though part of the agricultural sector may be non-tradable.

Now there are a lot of steps that could intervene between the measurement of the real devaluation on the one hand, and the measurement of the aggregate agricultural terms of trade on the other. There are trade liberalizations that go on that involve a change in export taxes which would generally tend to reinforce the relationship. There are import tariffs that generally tend to reduce the domestic import price of imported foods. There are world price trends that have generally trended downward for food crops, which would tend to depress the price of tradables. There are market reforms, which if they work properly would tend to lower consumer prices and raise producer prices. There are intervening market regulations which separate what otherwise would be a fairly clear connection between the exchange rate and tradable prices so that in fact agriculture behaves like a non-tradable even though it's potentially tradable. Then there is the issue that Chris Delgado and others have raised, and that is that even on its fundamentals is agriculture tradable or not? If you have a large portion of root crops, for example and other commodities that really are non-tradable, then maybe this assumption about tradable agriculture is not correct. Or maybe because of the wage good impact of non-tradable agriculture it feeds into the cost structure of tradable agriculture.

So there are a number of reasons to expect that you might get the relationship that the structural adjustment theory predicts, and there are reasons to expect that you might not.

All I've done is show that there doesn't seem to be such a clear relationship. I threw it out there just to stimulate some thinking and maybe get some reaction from all of you.

Delgado: I think this kind of presentation is very useful for stimulating discussion, and I thank the organizers.

Now, to contribute to that discussion, I think that contrary to some of what is said, the general graph of TFP is probably fairly correct for the continent as a whole. The question is what does it mean? And in fact, if you compare the general graph to the regional graphs, in terms the message it conveys, they are very similar.

What the graph shows seems to be that output growth is higher than input growth in the period from '78-'83 to '83-'88. I think that possibly there is an issue of policy response there. Possibly there is an issue of rainfall being better in the second five-year period -- and this was fairly general throughout the continent in fact.

But what is fairly clear also as a real issue is what's happened to input use. That is very different by country. My guess is that for a large number of countries we'll find that input use has gone down per hectare, or if not per hectare certainly per labor unit. That augurs very poorly for structural transformation. That was point one.

Point two I might add as sort of an auxiliary point. Figure two shows a major increase in the nominal protection coefficient over the last decade.

Well we know in West Africa, for example, that the average export unit value, excluding the petroleum exports, has fallen about 80% since 1981, which is an incredible fall in terms of trade. About half of this fall has occurred since September of '88.

Now, what this Figure 4 shows is about a 50% increase in the nominal protection coefficient. If these two pieces of data are both correct what we're seeing here is that in fact the domestic prices for agricultural commodities have fallen, but they haven't fallen as fast as international prices. And my guess is that if you do a careful analysis by country you'll find that agricultural terms of trade has not done very well over the 1980s for most agricultural producers in terms of what they can buy with their output.

Now, to come to the main point, which is the countries with real devaluations. I think Dick has made part of the point I wanted to make. We were asking what are the impacts of structural adjustment? This is a time series question, before and after. Like all time series questions we don't know what it would have been without structural adjustment. So, that's why we look across countries.

If we look across countries we have to decide what are the relevant strata? Is it variability? Is it geographic, or so forth? And I'd like to suggest that the degree of tradability of the economy in general and agriculture in particular is the relevant stratifying variable for looking at before and after the process of commercialization.

To be specific on this graph I think that in the open economy one would definitely predict your nice downward sloping path, as you pointed out, Dick. Because definitely all the macro-economic incentives lead that way under real devaluation.

But in the semi-open economy, where in fact a lot of agriculture is non-traded, and a good part of non-agriculture is traded, one would predict the opposite, in fact. And there the relevant stratifying variable is the degree of tradability. I think it would be interesting as we ask whether a structural transformation is occurring, to look at the extent to which economies are moving from a semi-open status to an open status under structural adjustment, and what that might imply.

Staatz: I wanted to come back to a point that Samuel Dapaah raised, which I think is related to a lot of our discussions. We've been talking about the agricultural transformation in terms of increases in productivity, various ways of generating, if you will, a surplus in agriculture. I hope as

we move through the discussion later, both today and later, that we also talk about the utilization and the extraction and the reinvestment of that surplus, because I think that's part of the dynamics. Samuel was raising questions about changes in real exchange rates, the questions of effective protections, all the various mechanisms in which that surplus is either extracted from agriculture and transferred to other sectors, or allowed to remain there for reinvestment.

As we try to gaze into our crystal ball, I think there are some important changes at least in some places in Africa that may augur well: moves towards more accountability and decentralization and so forth, which may allow more of those resources to be productively reinvested. But the other part of the equation in transformation is not only producing the surplus, but reinvesting it productively.

Monke: I wanted to reiterate, I guess some points that have been made by Chris and also just now by John, and that's to ask about the interpretation of these kinds of results and what they're telling us, if anything, about agricultural transformation. Do these results really tell us something about technological change as a process? Or do you feel, Steven and Dick, that maybe what they do show us is quite consistent with price response and a relatively stagnant or fixed kind of technology?

I guess I've been a bit enamored of Dunstan's espousal of the rather stagnant technologies in many of the production sectors in agriculture. And that's not just because he's a lot bigger and stronger than I am, but also because that's what I've seen in my very limited observations of microeconomic situations: not a tremendous shelf of new technologies, not a tremendous green revolution kind of story and things that I've been exposed to, which is primarily in Kenya. At the same time I've seen tremendous amounts of price response, both in terms of taking advantage of crops that become much more profitable than alternative crops because of changes in price policy, and because of changes in particular commodity prices.

There was an earlier comment, that there is a tremendous response in agriculture to changes in prices. It seemed to me that perhaps from the kinds of things we've been hearing that the sort of changes we've seen have reflected in a very broad aggregate a period of prejudice against agriculture in terms of price policy, and then a tendency to come out of that in the 1980s. Do we see that tendency increasing and strengthening in the 1990's?

And then finally, to maybe ask in a slightly different way the same thing that John was talking about, is this the thing that we're really concerned about? Are these factor productivity measures what really matter? Or should we be looking at what's happening to the real income of farmers in various regions or of particular types of farmers. Is that the measure that we should really be focussing on in trying to understand what's happening to purchasing power, which can change for a whole host of reasons, including technological change.

Endeley: I also wanted to tie up the two comments. It seems that Mr. Staatz is asking that what is happening to the surplus coming out of agriculture and Mr. Monke is saying there has been

a high response to price, which to me goes to say that the farmers now have a higher income because of the prices. With the higher income they should be able to invest in agriculture.

Goldman: How we interpret Steven's results are absolutely central to an understanding of what's going on. Steve has provided us with some really interesting, tantalizing results, and now the question is what's underlying it all.

At one point Steve's data showed, for example that 75% of the growth in output came from area expansion and crop substitution.

In the partial productivity graphs where you've got yield per acre on the vertical axis, you show much faster growth rates there of yield per hectare than I would have expected are consistent with the first observation, where only 25% of the results are coming from yield.

The yield per hectare shown in the partial production graph includes not only an actual physical response of individual crops, but the aggregate value of those crops measured in wheat units, and so if there is a crop system change toward higher value it's going to go over the same acreage base, and you're going to see an increase in yield per hectare.

Now, Eric's question: Are we getting essentially a move down our production possibility curve from a highly distorted point where we're far away from comparative advantage toward a higher valued point, which is closer to comparative advantage? This is really the structural adjustment hypothesis. We're going to get an increase in the price of tradables, we're going to get a supply response of tradables, we're going to get a higher valued economic system, but we may not get any substantial improvement in yield of any particular crop.

The next question is John Staatz's question, and that is what is the macro system going to do with that surplus that's been generated by structural adjustment policy? Is it going to waste it with over-consumption at the macro level, or is it going to invest it in productivity changes at the macro level?

We might get a clue about the crop production issue by looking at inputs and asking ourselves: Are we seeing really important changes in fertilizer use in Africa? Now, we can look at the import statistics to the extent that they're accurate to tell us that, because there's not much domestically produced fertilizer. Is there substantial improvement in new seed variety uptake? If there's not much change in fertilizer and if there's not much change in new seed variety uptake, then it's hard to make the claim that there is a sustained transformation that's going on through the technical change route.

But that's exactly where the conundrum is, that's where we need to get some answers.

Spencer: Again, I think we come up the bottleneck that we might not have very much. There has not been an increase of import of fertilizers. The fertilizer use in fact has gone down, I

would guess, if you look at it. But if you disaggregate by agri-ecological zones and by regions, you find cases where there has been a substantial increase in use of new seed variety. We do have some seeds which can increase productivity significantly in terms of output per unit of input that you use, including the purchased input. So, I have a question as to why Chris Delgado is worried that a decline in input use augurs badly for structural change over time.

The African economies have to get to the stage where they can effectively use the inputs which are available locally. If we see there has not been an increase, or we see a decline in use of purchased inputs, particular inputs that are imported out into Africa from other places, yes, the degree of tradability of the production process declines. But I don't interpret it automatically to mean that it's a bad thing for the long-term growth and structural growth of agriculture. It might imply that we need to have our policies and our research policies get to a different state where we start to think of less use of some of the traditional inputs that we have been talking about.

I wanted to comment also on the start which Richard and Steve have made in terms of disaggregation of the information into these different agri-ecological zones. I think it's a step in the right direction. However, I think it needs to go further. The information we have already in GIS systems would allow us to actually disaggregate into agri-ecological zones within the zone. The biggest problem, of course is research and economic data, which is not yet sufficiently disaggregated.

Delgado: To answer Dunstan, I don't know actually if fertilizer use has declined on a continent-wide basis or not. For sure, there's some disagreement between IFDC and IFPRI among others in this, but my guess is that it has. That worries me greatly because there is no way to get the kinds of agricultural growth rates, 3% to 4% that one needs without something of the order of 10% to 15% growth rates in fertilizer use per annum, starting from the current base that we have. I'm pretty sure that fertilizer use hasn't been increasing at that rate.

Now, why worry about that? Basically we're concerned about whether the results represented by that curve going up in the Eighties was a one-shot sort of deal. A one-shot adjustment maybe because it rained, and it can stop raining, or maybe because there was a response to a big distortion which was corrected.

I think in the 1960s, when we thought about development economics as economists, we used a more dynamic methodology. We worried about time paths. In the 1980s, when trade economists took over development strategy, we used comparative statics. If you want to maintain a steady-state growth one has to have an increasing rate of investment, and I don't think there's any evidence that we've seen that in the agricultural sector there's an increasing rate of investments in any of the things we need to see to get that growth path.

Deng: I think I'll go back to the TFP growth rate and ask a question or two that will clarify my understanding of the situation. Otherwise I will be lost in the debate. Now, what is the structural

relationship between agricultural TFP growth rates and that of the GDP? Second point is what are the stated factors for the seemingly poor performance of the TFP?

Block: The question of how agricultural TFP relates to aggregate economic growth is an wide open one. It's actually the subject of the next research project that Peter Timmer and I are going to work on. It's our expectation that agricultural TFP contributes positively to aggregate economic growth. We're going to try to model that relationship. To the extent that TFP is just an accounting component of output growth, and Dick showed the association in his tables of that accounting relationship between agricultural growth and economic growth, there's a direct link. We suspect that there are other more dynamic linkages between agriculture and non-agriculture that would contribute to economic growth.

Deng: Then let me come back and add my comment, because this is the answer I expected. Then I think there are a lot of contradictions here. If you look at the development literature in Africa, I think the period which you have given where there's a decline, you will see that African economies were growing faster than the rate of growth of the population, if and you take that period of '63 up to the oil shock of '73. This is not consistent with the agricultural TFP estimates we've seen here.

Abalu: First of all I'd like to congratulate both Richard and Steve for this initiative. I think it provides useful information which we can build on. My question also follows Lual's in terms of trying to tie this phenomenon that we're seeing to a specific yardstick over time.

For example, as Lual said, are there any particular yardsticks over time which we could use to try to explain some of these related movements between output and input over this period? I was surprised that Steve didn't even attempt to use some of Richard's categories in terms of low, medium and high countries to correlate the two stories.

I agree with Dunstan, that the categorization into climatic zones is important. I would also have liked to do more with macro-economic policies. In this case there is no substitute for more disaggregated analysis. In other words, policy for policy, categories by categories of countries, so that we have some clearer picture in terms of explanatory variables. This is a more descriptive exercise.

Endeley: Thank you very much, lady and gentlemen. I imagine whoever has a burning issue can either go to Richard or Steve and discuss the issue. That's the end of this session.

V. AGRICULTURE'S LINKAGES TO THE NON-FARM ECONOMY

Magagula: I will request and appeal to all colleagues to be as precise and as brief as possible if we're going to make advances in our discussion of this next topic, which is the agricultural linkages to the non-farm economy.

Basically this starts with Section B of the Winrock book. This morning somebody bemoaned the fact that we don't have agri-business people who would indicate to us whether some of the policy changes are of use to them in terms of taking advantages of the investment opportunities which present themselves. This was the connection with structural adjustment. But I think what would have benefitted our discussions, would have benefitted immensely if at this stage we also had some people from the other side, from the non-farm economy who are going to indicate.

But I'm sure colleagues have a fair idea of what has been happening in the African agriculture and whether we have been able to reasonably foster those linkages which are essential between agriculture and the known agriculture economy.

Abalu: One of the first things that struck me in the Winrock group's discussion of inter-sectoral linkages was the importance of this micro enterprises, and the emphasis that it appeared the group was going to give to its development, and so I was a little bit worried here, because I thought we don't know very much about it.

The question is can you develop your micro enterprises separate from improvements in the rural agricultural production? In other words, can you have a micro enterprise that develops when the agricultural sector itself is in decline?

Endeley: In pursuit of what George has raised, basically I feel that most of the micro enterprises are agriculturally-based. I think we need a forward movement in our agricultural production for these micro enterprises to foster reinvestment back into agriculture.

At present, I don't see the capacity of micro enterprises being able to reinvest in the agricultural sector. The demand for the kind of services that micro enterprises can provide in the agricultural sector is not there.

If productivity is increasing we are hoping that there will be demand for micro enterprises services based on the general opportunities created within the country.

For instance, if we want people to invest, the farmers to buy inputs, then there must be a profitability in doing that. And if that is the case, I think micro enterprises will readily fill in the gap of providing those services or technology.

A lot of the micro enterprises are having difficulties in even finding markets or gaining access to capital to invest in their enterprises, to the certain extent that a lot of them just grow by the day and die by the day. They are not sustainable.

Gava: I'd like to point out that productivity growth can have unintended distributional effects. Let's say you introduce earth plows to farming.

Formerly if the cultivation was being done by hand hoe, by introducing this somehow improved technology, it becomes more attractive to the male members in the rural areas.

So, in that case you get the females being displaced by the men in on-farm employment.

You may have an improvement in both the micro industry as well as agriculture. But the wealth which has been created may be going to just a few, I mean leaving out the women.

If you move away from agriculture as such, go to other areas like water collection, that is usually a woman's job. But once you introduce more convenient ways to get water, or you have paths to bring that water, the females lose the job. The same goes for processing the millet, the sorghum, or whatever you have. Whenever you have an improvement in doing that job, that difficult job, once it is made lighter, you find the displacement of the females.

So, what can happen as a negative response to this productivity improvement in the rural areas is that the share of what you have created is unevenly distributed between the women and the men.

Abalu: I think I'm confused with this. Are we suggesting that technological improvement is necessarily bad, in that it discriminates between the sexes? Is this the idea? Because I think what was being suggested earlier was that maybe we should identify those areas where there are linkages, positive linkages between micro enterprises and the producers.

Ikpi: My comments are going to be based on the fact that income that is needed for investment in agriculture can only come from outside agriculture, as far as the present situation in Africa is concerned. So, if we can develop any strategy that will establish or encourage an investment in non-farm areas that can link properly with agriculture, either backwards or laterally, then we will be trying to achieve the desired goal.

I think the most important form of intervention that we could encourage at this time, if we want to transform agriculture in Africa, would be for us to encourage the development of what I would call export-free zones, or export processing zones in selected parts of Africa. These export-free zones will have to include small-scale agro industries that should be developed in such a way that they energize agri-technology transfer either within Africa or even from outside Africa to different parts of the continent. This, I know, is what happened in the case of Southeast Asian countries.

If we want to follow that development of export-free zones, then we look at the things that it should do. For instance, it is the only scheme that could very meaningfully offer competitive incentives in both production, imports and exports, that will attract investors, whether they are local or they are foreign, into Africa. And if that is done, then they will have to go to these designated industrial parks to establish those processing industries that can either go back and call on farm products, or at least encourage manpower development that will bring about improvements in technology, and therefore increase incomes to the people. In doing that, they will encourage backward linkages, or lateral integration. Both of these, would lead to increased agricultural production. That link is there. Because what they will need in each of these industries must necessarily fall back to sourcing for the inputs locally. It will not discourage importation of raw materials, but at least it will limit it to an extent, because of the import incentives.

Thirdly, this export-free zone, or export-processing zone scheme will provide technical training, and of course many opportunities for technological transfer, which we know if we do not have in Africa we cannot transform agriculture. We need the technological transfer that is appropriate to particular processing techniques that will then flow back to farmers in Africa. Of course it will subsequently lead to the desirable linkages that we want, including the generation of income to all genders.

If we accept the development of these export-free zones, then we have to accept the requirement that it has to be private-sector propelled. Governments can only come in as the provider of enabling legislation or enabling environment. Outside of that, all the operations within the industrial parks will have to be run by private sector companies.

It will encourage agri-investment by removing it from the present position where agricultural investment in Africa is a residual. Presently, it is only when investments have been made in all of the other productive sectors that somebody thinks of what is left being put into agriculture. So, if we can change that thinking, we can change the position of the place of agriculture in the scheme of things from one of residual to one of priority. It is then and only then I think we will be doing something right.

For this to happen, I think we have to consider the monopolistic attitude of developed countries' businesses, because they will not like to see African countries break into the export market, and that is very serious. If we do not get the export market, at least a portion of it given to developing countries, we're done. All the things we're talking about now will be wasted. So, we have to appeal to developed country businesses, that they should be ready to accommodate finished-product exports from developing countries and to team up with African businessmen. International donors have a role to play in encouraging these connections.

Dapaah: First of all I agree that in fact there is a need to go back to this whole area of building the micro-linkages with agriculture. Unfortunately about 90% of all the micro-enterprises are handled by women, and these are the people we discriminate against policy-wise in terms of

education, in terms of credit, in terms of everything else. But they are the key to the linkage between agriculture and the non-agriculture, at least in the area that I'm coming from.

Now, I do not agree that investments can only come from outside. What we could do using policy, and it is what we're trying to do in Ghana, is to find a new way of encouraging investments in these micro-enterprises. The way we are doing it is to try and increase agricultural productivity, by financing investments in rural communities through matching grants. The rural communities, whether we are talking about agri-processing or storage, or access to markets, will determine what are their priorities, instead of the central government determining their need. They would demonstrate that in fact it is a priority by actually showing willingness to contribute either in cash or in kind.

So the labor from that rural community is an investment. Now, they will also indicate how such facilities will be sustained, because one of the greatest problems in the area I come from is how to sustain anything that one builds - the maintenance of these structures that will improve rural productivity and micro-enterprises has always been a problem.

Once they indicate that they understand this process and they are willing and capable of helping maintain these structures, the needed financing will be made by giving them grants.

What that does is to target the scarce financial resources really required to improve the capacity of the rural community to build up these linkages, and also sustain them. So, what I'm saying is that more money is not necessarily the answer in all cases. Better coordination is.

Rukuni: What I would have like to hear in the discussions, and I don't know if we're going to get to it in the next two days is if we agree that agriculture is going to be the main engine of economic growth, the question for me then becomes how can we pursue an agricultural-led rural industrialization approach?

The only difference I might have with George, though, is that I'm a lot less suspicious of micro-scale enterprises, and as I get older, much less suspicious of cash crops as well. similar reasons. The closest we are to perfect competition in any sector is probably small-scale agriculture.

When you liberalize an economy, like Zimbabwe, for instance, the first thing that strikes you is that all big business are the monopolies, whether you are talking of the manufacture of flour or you are talking of shoes or fertilizer, it's all monopolies. So, at the end of the day we are liberalizing an economy and handing things over to monopolies. It's going to be very difficult to break these monopolies. And as countries like Zimbabwe and others are trying to find ways of putting into place anti-trust laws and so on, I think the biggest move we can make in the meantime is to promote small-scale enterprises.

At the moment, with the current levels of population growth and rural unemployment I don't see how either agriculture or formal employment are going to absorb all these people -- it's just not possible.

There's also evidence in this part of the world that there is a close relationship between performances of those households that have family members employed elsewhere, within the rural area as compared to those who actually don't have any businesses or other sources of cash or loans from elsewhere. I think that's a fairly important point to remember.

So can we talk sometime about an agricultural-led industrialization approach, and can we talk about how then in the process we get a lot more value added within the rural community?

Martin: I wanted to make a few comments about export processing zones, and Tony Ikpi's comments about them. I am highly suspicious of them, particularly in the area of agriculture. In some ways I think they may well be a gimmick to try to address some of the problems that you did mention, Tony.

One is that most export processing zones or export-free zones are related to labor-intensive jobs such as putting together watches and computer chips, textiles, etc. Well, when it comes to agriculture, if you're talking about an export processing zone, generally agriculture exports aren't highly processed, and indeed most of the commodities are either exported fresh or they're in bulk. A particular industrial unit in one place built with government funds I think is not likely to be necessarily attractive to investment by people who are going to be exporting those products or importing them from other countries.

Secondarily, what government could do, to be much more effective than building buildings in a particular area, would be to do such things as support contract enforcement; provide a sense of security to investors; reliable communications. I can't tell you how many exporters I've talked to in Madagascar and other parts of Africa who cannot get their faxes through, who can't respond to requests for supplies in a timely fashion.

No one's mentioned the word corruption yet, but the fact of the matter is that there are a lot of people who don't want to invest in agriculture in Africa because they have to get licenses, and they have to pay extra money to get those licenses, or their products are stolen when they're in storage at the port. That kind of disincentive to investment is a serious problem. Cargill and McCormick have other opportunities elsewhere in the world, and they're going to go elsewhere when they run into those kinds of obstacles.

So I think that rather than focussing on an export processing zone or an export free trade zone, the kinds of things that could be done would be more at the policy level, more at the regulatory level, more in the area of trying to insure that investments made by either internally by other small enterprises, or by foreign enterprises in agriculture are going to pay off, are not going to be subject

to external taxes, as you might call them and that the returns on those investments will be more reassured.

Deng: Let me go back maybe where Tony Ikpi stopped, and I think bring up the challenging issue which I felt needs to be addressed. Let me disagree with him on the first part of encouraging export-free zones, and let me agree with him on the second part where he felt that the private sector should be propelling that strategy. What I would say is what Jerry has just said: that you clear an environment, let the private sector in if they want.

I think the challenge goes back to what Mrs. Gava said in the morning where you find that almost all the African countries are being encouraged to produce the same cash crop for export, and this is where the problem is. What you need to emphasize is to go back to the fundamental economic reality, whereby you have 500 million mouths in Africa.

The preoccupation of policy-makers, researchers and others should be how to meet the domestic demand. So, let us satisfy the domestic market first, and then where there is a surplus we'll be exporting. Let us look at that strategy. I'm not talking about import substitution, but more of making agriculture satisfy the domestic demand of Africa, and then export the surplus. Nigeria is an example.

We are finding a lot of opposition from outside Africa to African integration. But the key is economic integration, and we should actually discuss what is happening in PTA, in SADAC, and other places. Fortunately now the World Bank has accepted economic integration as a key to development in Africa, despite having resisted over the last years.

So, maybe we have to emphasize that one, and the rest will come.

Mwangi: The former president of the Republic of Tanzania, Julius Nyerere, was once lamenting on how he was having problems dealing with the development policies in Tanzania, especially when it was being guided or advised by people of whom he said, "Look, they don't understand. They are going to the moon. I'm trying to get to the village, and I'm not doing a very good job of it." I wanted to plead that first before we talk about the agricultural linkages, the non-farm economy, we ask ourselves, how do we create an environment in which those linkages can form? And the one area that I think we should start with is how do we encourage the public sector to invest in rural infrastructure, broadly defined as roads, to enable the majority of the small scale of farmers, who are 80% to 90% of agricultural people, to move their products from rural areas to get to the towns, to enable them to change their inputs, to buy the fertilizers, to buy the herbicides, to move those again back to the farm. I think those are things that would definitely create some of the linkages we are talking about, and that's where these micro enterprises come in.

And define it broadly: roads, water, family planning, education. Women are the biggest contributors of the agriculture production. Yet, their time is so constrained in other activities. Most of the women in rural Africa, walk 20 kilometers in a day just collecting water, or something else, or

going to a clinic. Better infrastructure is essential to improving the efficiency of women's labor, and improving this would help to generate the types of linkages we are discussing.

Spencer: It is a fact that we cannot envisage the effective development of agriculture without the development of the non-farm sector, particularly small enterprises, micro enterprises, as George Abalu has called them. These are the dynamic enterprises that have the same sort of problems as agricultural production enterprises and therefore need the same sort of support. They go hand-in-hand, we cannot handle one without the other.

We have to be able to support these micro enterprises to move along as the agricultural sector develops. And there we have a number of problems similar to what we have in the agricultural sector. I don't agree with Tony that you look for the solution in export-free zones. I agree completely with Jerry, that concentrating on such zones might just divert attention from what needs to be done for the non-farm, particularly small, enterprises.

I think we have to consider appropriate technology here also. Twenty, thirty years ago, there was a lot of talk about non-farm small-scale enterprise development and governments had institutions to transfer modern technology to them - all of which virtually came to nothing.

You have in the recent past a lot of unfair competition from overseas with the dumping of subsidized products such as what we call "junks". I don't know what you call them in some other countries. This is used clothing that comes from Europe, so that they include winter clothes and are available in the markets, at very cheap prices making it very difficult for local clothing enterprises to compete. So we have to look at how to prevent unfair competition if we want these enterprises to develop. You also have to look at how to create the domestic demand.

Finally, I think again that we need to disaggregate the situation in Africa. There's a big difference between countries where the small-scale enterprises have been playing a major role and that's in a lot of the West African countries, from some of the Eastern and Southern African countries, where the larger enterprise or medium sized enterprises have been developed over time. Certainly the strategies that you need to adopt are different in these two situations.

Ackello-Ogutu: I wanted to follow up Tony's proposal of export processing zones. Indeed the idea of export processing zones is not new and some of the African countries already have operational schemes. However, I have reservations about their efficacy in boosting exports of agriculturally based commodities.

It is likely that the export processing zones in Africa will be concentrating on manufactured goods produced by labor intensive technologies. If the real wage rates in these export processing parks are not adequately low it is unlikely that the African products will be competitive in the international markets, the barriers created by the developed economies notwithstanding. It is also unlikely that intra-Africa trade would be encouraged if all the African countries opted for the same

commodities, agricultural or non-agricultural. There must be some complementarities in the product mix for the trading partners, and that is still lacking in Africa.

As far as agriculture is concerned, I see only marginal benefits arising from export processing zones. Furthermore, linkages that could be exploited currently lie in the traditional agricultural exports such as cocoa, tea, coffee and textiles. One has to be wary about linkages that would exacerbate income disparities within the cities and between the cities and urban areas, especially if export processing is biased to certain industries.

Improvement in exports, be they agricultural or non-agricultural, requires an aggressive business culture and it seems as if we still lack this in Africa. This weakness probably arises from our lack of exposure to international markets. Related to this is the issue of idle agricultural land or land not used on the basis of sound commercial terms. It is desirable that African countries implement a policy of land taxation in order to encourage commercial and export production and to discourage speculative ownership of land.

Exporters from Africa must acquaint themselves with the rigors and demanding conditionalities of foreign markets without undue reliance on government protection. But the irony is that when it comes to agricultural products, government protection seems to be the in thing worldwide. By and large, the African exporter has to be competitive in terms of price and services and he has to be outward looking. The description we got recently on a visit to a German Chamber of Commerce that the African businessman (compared to his South Asian counterpart) is undisciplined, unaggressive, unethical and incapable of coping with the rapidly changing tastes and demands in Europe must be discarded.

Delgado: I'd like to get back to the issue of structural transformation, agriculture and the private sector, and build on some things that Mandi has said, that Wilfred has said, and others.

I will relate some results from a seven year research program that was largely given leadership by Tom Reardon, who's now at Michigan State University, but involved a number of us at IFPRI and a number of people at West African institutions. This admittedly only involved three Sahelian countries; Burkino Faso, Niger and Senegal and who knows how it can be generalized?

After a large period of time spent looking at how people derive their income, we found that farm households across the ecological distribution were deriving somewhere between 25 and 40% of their total income, total -- not just cash -- from non-agriculture.

We found two kinds of diversification out of farm income. One was an outward-looking form of diversification, which is broadly observed in semi-arid and fragile regions outside of Africa in as well Latin America, in India, for example. This is reaction to risk, that people find sources of income that are not highly correlated with local cropping income, so that if the rains fail there's some source of income. We find this in the Sahel too. But more interestingly, in the high-potential cash crop zones of all three countries, we find a kind of inward-looking diversification that actually increases

across the income distribution of households. That is, the higher incomes are the more they tend to be diversified out of farm and this is contrary to what has been observed in Asia and Latin America.

Now we have a disagreement in the research team as to the interpretation of this. One interpretation is that this is simply the fact that you're in mono-cultural agriculture and people need something to do outside the agricultural season; another is that these are large households and within these households, some people specialize and some don't.

My personal interpretation, and it's backed up, I think by some further investigation by Jane Hopkins at IFPRI, is that this is basically a reaction to market failure and to market policies. In fact there is substantial evidence that this kind of diversification is at the expense of agriculture, because a lot of it does occur during the cropping season.

Now one has to ask why in these countries -- I don't know if it's true of all of Africa -- but why in these countries does one observe something one observes nowhere else at least outside Africa: that your higher-income households in the high potential areas are diversifying and that this diversification is increasing across the income distribution? There has to be a loss there of some kind, a loss of the division of labor. Elsewhere in the world, where one sees diversification, one sees it between households. Some households become tailors, some become blacksmiths, some grow crops, et cetera. Or one sees it between regions. There is a division of labor that develops with structural transformation.

Why in these Sahelian countries do we see something else? I think it has something to do with the fact that there's no banking system, that you can't get credit or liquidity another way except to be sure that you have a source of cash income at a certain time of year, which means diversifying out of doing what is in a sense your comparative advantage. It would be an interesting thing to discuss over the next few days.

Ehui: I would like to react a bit to what Chris Ackello-Ogutu said.

On the land tax issue, I think it would be useful of disaggregating African countries. I am quite sure that Chris is talking about the case of Kenya, where private ownership of land is more dominant, than other types of ownership and where it is easier to apply land taxes. In most other African countries people still have cultivation rights without owning the land itself, and it would be quite difficult to apply tax on land. It may not be a viable solution for all countries.

Now, concerning the issue of business breaking into the European market, how realistic it is to expect Africans to compete with Europeans, especially in the area of agri-business when the Europeans are getting the total support of their governments. I'm talking about the price subsidies and other programs that EC countries are providing to their farmers. It would be extremely difficult for Africans to compete in that market, unless strong measures on trade liberalizations worldwide are taken.

VI. BREAKOUT GROUP REPORTS AND PLENARY DISCUSSION

In the morning session on day two, symposium participants were organized into break-out groups. During the first session, three break-out groups discussed various issues relating to agricultural technical change. In the second session, three break-out groups discussed policy issues relating to economic incentives, agricultural marketing, and the role of exports crops. Each break-out group was given a set of two to four questions as a motivating device. In some cases the groups discussed all the questions, in others only some of the questions were covered, and in still others, the questions were either replaced by the group or reformulated. The original questions are shown below at the head of each break-out group report. Any replacements or reformulations are indicated in the reports themselves. The break-out group reports from the first session are included below, with their plenary discussions. This is followed by the reports from the second session and the associated plenary discussions.

Technical Change; Session 1, Group 1

Objective: To create new agricultural technology that contributes to agricultural transformation and a sustained agricultural growth rate of 3% or more.

Suggested questions:

- 1) Is there an important inventory of feasible agricultural technologies available to African farmers which is going unutilized?
- 2) What are the 5 highest pay-off research areas which could support sustained agricultural growth of 3 percent or more? In what agri-ecological regions are these research areas likely to have the highest return?
- 3) If you were the Director General of Agricultural Research, what are the first 5 changes you would make in the Agricultural Research System (including Donor Participation)?

The group began by defining the term "pay off" as meaning contribution to GDP, using a long term time frame to capture issues of sustainability.

Question 1 was paraphrased by the group as to whether these currently exists on important stock of appropriate technologies which are under utilized due to policy and technology transfer constraints. The group also considered whether on-going research was likely to produce such technologies in the medium-term (5-10 years). The discussion was structured by examining the major AEZs and, within each, examined improved genetic technologies and commodity/resource management technologies.

Humid Zone

The group identified the following commodities in which these exist under utilized HYVs: cassava (capable of increasing production by 50% on 50% of currently planted areas), sweet potato; oil palm, cocoa and coffee (for extension to small holders), flooded rice (for irrigated and mangrove environments). Improved genetic materials would be available within 5 years for the following commodities: plantain and rice (for upland and inland valley ecosystems). No improved technologies were identified for yams, maize or livestock in general.

The group identified the unsustainability of intensified cropping systems, for all but tree crops, as the major unresolved problem. As population grows and leads to reduction of fallow periods, soil quality degrades more rapidly in this AEZ than elsewhere. Recent research has shown that alley cropping technologies are not well adapted to this environment.

Sub-humid Zone

Improved genetic materials are now available for cassava in 50% of the area and sweet potatoes. Although HYVs are available for maize and sorghum, their superior performance is dependent on high input levels which are not sustainable. HYVs of rice are now available for irrigated systems, and will be available in the medium term for upland and inland valley ecosystems. In the livestock sector, supplemental feeding technologies are available and appropriate for areas of high population density. Similarly, modestly improved dairy technologies are available but face significant marketing constraints. The group also saw vegetable production as having high growth potential in and near urban areas.

Although natural resource management constraints to sustainable intensification are least binding in this AEZ, they can still be important. Alley cropping systems, including maize as a lead crop, are available and well adapted, particularly on sloping lands.

Semi Arid

HYVs for sorghum are currently available, but appropriate only for large scale commercial farms that are generally extended to brewing or livestock feed. Good progress has also been made in the development of short-duration sorghum and millet varieties, which, however, yield similarly to local varieties under low to moderate input levels. Although these shorter-duration materials provide some protection to downside risks caused by poor rainfall distribution, they will not contribute significantly to aggregate production, and can encourage farmers to expand production to marginal environments and into marginal soils which degrade rapidly. HYVs of cow pea are also available but uneconomic due to dependence on chemical insect control.

HYVs of cow peas suitable for sustainable small holder production should become available within 5 years. HYVs of rice are already broadly adopted for main season cultivation under irrigation. Varieties for off-season cultivation that are tolerant of temperature extremes and salinity will be available within 5 years. These could have the effect of increasing rice double cropping from 25% to 75% of current sown areas, and yields by up to 40%. In less favorable irrigated areas, the group sows large potential for increased vegetable production applying technologies already available.

In the livestock sector, the only significant potential was for crop/livestock integration, the primary benefits of which would be to maintain soil quality in intensified cropping systems. However, much more adaptive research is needed before these systems can enjoy breed adoption.

The group concluded that other than for vegetables and rice, there was little potential for large contributions to GDP in the semi-arid tropics. Research and development from here should be on these growth points and on the transfer of known technologies to arrest and reverse soil degradation (e.d. rock-lands).

Soil

The group quickly concluded that there was little growth potential in this region outside of irrigated rice and vegetable systems. Rainfall ecosystems are best adapted to extensive livestock lending.

Highlands

Both improved genetic materials and appropriate management practices are available for transfer to small holders for maize, coffee, tea and potato production. There is large potential for improved livestock rearing using zero grazing technologies in and around urban areas. Similarly genetically superior dairy cattle are also available and well adapted to highland conditions.

The group only briefly considered the availability of post harvest technologies, and tentatively concluded that: technologies are generally available to improve processing and storage of cereals; policy and extension constraints, however, limit adoption; little improved technologies exist for root crops; dairy transformation technologies also exist.

Time constraints restricted the discussion of question 2, which was to identify the highest pay-off areas to emphasize in order to achieve a 3% growth in agricultural GDP.

The group concluded by considering the major policy issues for which additional research is required. There was agreement that first priority should be given to further research on output markets, processing, and infrastructure. Second order priority issues were in the area of extension

and input markets, including credit. Further discussion of this prioritization was needed. Finally, no agreement was reached as to the need for research on research policies and management.

The third question was not addressed at all for lack of time.

Policy and Management of Agricultural Research; Session 1, Group 2

Objective: To improve organization and management of agricultural research so that its contribution to agricultural transformation would enable a 3% growth rate.

Suggested questions:

1. What are some policy and/or management reforms which will make the greatest contribution to the research system's efficiency?
2. How can increased integration between agricultural research and agricultural policy management be promoted?

The group identified the following areas as those that required improvements for making the greatest contributions to agricultural research system efficiency. Integration between research and agricultural policy is addressed as part of the five areas considered for improvement.

Funding

Financial resources available for agricultural research from various sources especially domestic or national funds are considered inadequate. Ways and sources of funding agricultural research should therefore be explored, and creative initiatives instituted to raise extra funds from the range of potential sources from budgetary allocations to cost recovery.

Resources currently available for agricultural research are inefficiently allocated. For instance, most of the currently available research institutes/systems go into salaries and very little is left for operational purposes. While many agricultural research systems have insufficient number of scientists (under staffed), the majority allocate very little operational funds for research proper. This has resulted in what may be considered as over staffing given the number of researchers operating with virtually inadequate or very low research budgets. It is, therefore, crucial to put more funds at the disposal of researchers to facilitate efficient functioning of the system. This is achievable through the adoption and prioritization of proper research agents upon which meaningful budgets can be drawn.

Search for external funding and collaboration with regional and international research bodies could make supplementary resources available.

Human Resources

Support Personnel: Support technical staff in most research centers represent a limitation on the capacity and performance efficiency of these institutions in improved technology generation. The quantity and quality (level of training) of the technical staff need to be upgraded. We need to create more relevant training opportunities to sustain the role of field and laboratory technicians, as well as other support staff in the process of technical change.

Research Staff: The number of researchers at most agricultural research institutions is inadequate especially in certain fields of specialization depending on the country in question. Also the level of training and research skills of a large proportion of available research staff is deficient and hence, the need for continuous training, capacity building and upgrading of professional skills.

Recognition and reward to agricultural research excellence: A system of incentives to reward professional contributions and quality research needs to be established to motivate scientists. National award systems will also enhance recognition of the role of agricultural research and its usefulness at the national level.

Intellectual property rights (patenting) should be encouraged to manage and protect researcher's rights to agricultural innovations. This will also be important in determining whether technological discoveries reached through publicly funded research should be handed to public or private sector agencies to multiply and deliver to farmers. Without patenting or acknowledgement of intellectual property rights. Alternative systems are available for recovering the costs associated with public research (returns to public investment in agricultural research) such as the imposition of a compulsory contribution of say 2% of pre-tax profits by private sector companies.

Retention of scientists and trained technical staff: The rate at which agricultural research institutions lose research and technical personnel to private sectors and foreign institutions (migration and brain drain) is very high. Measures and systems of reward need to be established to minimize the rate at which research personnel leave the research systems of various countries.

Planning Agricultural Research

A Central Research Coordinating Council is necessary for the organization and management of research activities at the national and regional levels.

The mission of the agricultural research vehicle needs to be clearly defined within the national development goals. This is basic for establishing the proper agricultural research policy to guide research.

Better and more comprehensive information bases are required for improved management decision making and design of appropriate technologies by biological and other scientists.

Priority Setting

It is essential for research management and planning to develop sound methodologies for evaluating research priorities across commodities, regions and disciplines.

Good information and well-defined priorities will help research management allocate efficiently the research resources at their disposal.

It is important to ensure the relevance of the generated technologies by addressing farmer perceived needs and problems. Farming systems adaptive research and other approaches that will make technology generation farmer-oriented and site-specific should be adopted as the research strategy. Agricultural research should, however, also respond to non-farmers demands.

Communication of research results to clients, in a usable form, that is translating research findings into farmers recommendations and policy guidelines for farmers, policy makers and other researchers and extension agents should be encouraged. It is also very important to establish means that would enhance research extension farmer linkages and the efficiency and relevance of technology generation and transfer.

Promote public and government support for agricultural research.

Constraints to On-Farm Adoption of New Technology; Session 1, Group 3

Objective: To break constraints to form objectives of agricultural technology so that it contributes to agricultural transformation and a sustained agricultural growth rate of 3% or more.

Suggested questions:

- 1) Is there a large inventory of feasible agricultural technologies which are not being utilized by farmers?
- 2) Rank the 5 most important constraints to farm adoption of agricultural technology
- 3) What strategic reforms are required to break these constraints.
- 4) What is the most effective role for donor assistance in this area?

For question 1, the group agreed that it was important to distinguish between technologies that are being developed at the International Agricultural Research Center and those technologies which are already adapted to specific countries and conditions. Our discussion and recommendations were based on the latter set of technologies. We also agreed to try to distinguish between crop technology and livestock technology. After a good deal of discussion about specific crops in specific

countries a consensus emerged. Stated simply, we felt that most resources have been devoted to developing crop technologies for large scale mechanized agriculture (eg. wheat in Sudan) and for agriculture in high potential zones (eg. the Highlands of Kenya). In these cases there is a set of feasible technologies which are "on the shelf" available for adoption. However, these technologies are often narrowly focused on improving yield at the expense of other attributes. For example, many farmers and consumers are more interested in the processing characteristics of a crop than maximum yield. Researchers are not in tune with the needs and preferences of producers and consumers. Hybrid maize was cited as an example of a successful technology which has been employed by both large and small scale farmers.

The key area where the group felt that technologies were not available was for medium and low potential zones for rainfed agriculture. It was also noted that our group did not have representatives from major root and tuber countries, so we were unable to address this set of technologies. Due to time constraints, we were unable to address the issue livestock technology, though the general sense was that little technology was available.

In response to question 2, the five principal constraints to the adoption of feasible agricultural technology are:

1. The economic viability of the technology at the level of the farmer
2. Financial constraints which are based on macro-economic conditions
3. The low priority which governments give to extension and the lack of information available at the farm regarding these technologies.
4. The lack of timely availability of inputs required to use the technology and the labor requirements imposed by the technology
5. Problems associated with seed multiplication of improved or new varieties.

The group made a critical assumption in developing this list. It was assumed that technologies are technically and agronomically feasible so that the constraints refer only to problems farmers have in adopting technically feasible technologies.

During the plenary discussion it became clear that it was necessary to clarify the meaning of economic viability and financial constraints. By economic viability we meant the constraints faced by farmers when policies and marketing systems create distractions which make the adoption of a technology unprofitable at the farm level. We should have made a distinction between the financial viability (i.e. the profitability at the farmer's level) and the economic viability (i.e. the national economic environment which may not be conducive to agricultural production.)

In answer to question 3, the group identified five sets of reforms to break the aforementioned constraints:

Constraint #1: Eliminate policies which depress farm gate prices. Promote policies which stabilize markets. Encourage increased government investment in infrastructure.

Constraint #2: Promote policies which create macro-economic stability, reduce inflation and create a viable credit market.

Constraint #3: Government should concentrate extension resources on those food crops which are not attractive to commercial input dealers.

Constraint #4 & 5: Encourage the private sector to take over input sale.

We identified the following areas as the most effective roles for donor assistance in this area.

- Human Resource Development & Training
- Focus on promoting policy reform which creates an enabling environment for agricultural development
- Eliminate trade barriers and trade policies which inhibit commercialization of agriculture.
- Create networks of information exchange on technology development.

Plenary Discussion

Deng: I think what we now want to do is to open up discussion. Section by section makes sense. Why not start in the reverse from Number III, back to number I.

The third group is calling donors to support policy reform. But there seems to be a contradiction when at the same time we are calling for internalization of policy. Africans have to take the lead, have the ownership of macro economical policy. Now, if you ask donors, they will come with conditionalities, so you seem to be contradictory. So, we need to redefine the kind of support there.

Spencer: Part of what I have to say is in response to what Lual said, and that is the issue relating to political support for agriculture development. I think we have to make a distinction between support for agricultural production, or development activities, and support for agricultural research. The investment packages of the World Bank and the African Development Bank basically

represent a political expression of support for agricultural development projects. And the concern that I think we've expressed is support for research: that we don't have enough political support for research. That's why the research systems are decaying now under structural adjustment. When you have any financial crisis, the research institutions are the first to suffer. That's the first area that is eliminated or loses support. We need to mobilize political support for investment in agriculture in general, but most specifically in continued investment in agricultural research.

Also, I think the discussion of the constraints will have to be a bit more specific. When we are talking about Africa I think we have to be more specific in terms of zones where technologies are available and what the particular bottlenecks are. We need to be able to focus and agree on problem areas that we should probably be working on.

Monke: Just to respond to that a little bit, and maybe others in the group can correct me or elaborate also. I certainly take that point, that we're being extremely broad, and agree that the next stage then is to try and get more specific, like Dunstan was asking us to. But that really requires very much country-specific information, because it's not enough just to take an agri-ecological zone and think that the same policy environment prevails throughout that agri-ecological zone. Instead it's a nation-specific kind of policy environment. We were just trying to summarize what we felt were the more prominent kinds of constraints that appeared across many countries that our particular group was familiar with. That certainly limits the comprehensiveness of our analysis and our presentation, but, at the same time, I think it's a useful start at this particular level. One can then modify or specialize as one gets into particular countries.

Goldman: I was impressed with a couple of things, and I want to mention them to see if we can get some discussion to bring about further clarification.

I understood the report of the first group that Peter Matlon summarized to be saying that there is a substantial amount of promising researching in the pipeline for the roots and tuber crops, and not very much on livestock. I took that as an encouraging report, because that's the first time that I've heard that thinking over a ten year time horizon, shouldn't consider technologies for those food crops to be the binding constraints.

When Wilfred made his report, it was quite clear that the current situation in terms of availability of adaptable technologies was more constrained. So, one of the clarifications that I'd like to get is whether we really should be optimistic about the pipeline of research. I think it's a very important conclusion, if we should be. I think I've detected some serious skepticism about that from Dunstan, and I don't know whether Peter's group and Dunstan, at least, are on the same wavelength regarding those things.

I'd just like to know whether there's a general sense here from people who should know whether we should be encouraged by the pipeline of research on the non-cereal food crops.

The second thing I was impressed with was that the farm adoption people identified financial constraints and extension as being key constraints, and I'm hoping that we have here more than just a list of things, but that these in fact are strategic constraints. The World Bank, I believe, over the past fifteen or twenty years, has probably poured more funds into agriculture extension and agricultural credit programs than into any other kind of agricultural support programs in Africa. I think we would all agree that certainly in the agricultural credit programs there's a dismal record. And probably, if I get the sense of your views about the T&V system, that was not particularly effective either.

So, if agricultural extension really is a strategic constraint, and if financial constraints are serious, and we have already had two major sustained programs that haven't worked, what can we do about that?

Matlon: Mr. Chairman, I had another comment but I wanted to stay on what Dick has just said there. Through a personal communication from Daniel Benor himself, he recounted results of Evenson's recent work in Tanzania and Burkina Faso, where he was looking at the returns to investment in extension. And he quoted me rates of return of 180% in Tanzania, or thereabouts, and in excess of 140% in Burkina Faso, which would suggest that there is technology on the shelf, and that perhaps extension constraints are more important than we had previously thought, and that perhaps the T&V system may be more effective than we sometimes give it credit for.

I just wanted to put that out on the floor.

Second comment. In terms of the role of donors, one point was made that I thought was terribly important; that of creating international networks for information exchange. But I would look at an enlarged mandate for internationally-supported networks, and that would be for technology exchange and for task allocation in a regional research approach. If you look across every single national agriculture research system in Africa, there isn't a single one that has achieved critical mass to address all of its major problems working in isolation.

The other observation when you look across Africa is that constraints and agro-ecological zones cut across borders, and that there's tremendous variability in terms of institutional strengths in agricultural research.

What these three facts lead to is that a combination of resources, a sharing of tasks on the basis of institutional comparative advantage, could achieve significant efficiencies and economies of scale.

So, I'm suggesting a much more active task sharing and technology exchange in pulling together national programs in similar agri-ecological zones. What I have in mind is a vision of regional research systems where each national program would design its own research agenda on the basis of an analysis of what can be done elsewhere. A national program would only focus in those areas in which those programs have comparative advantage and borrow technologies and results from

neighboring countries which have relative strengths in these other areas. The only way national programs are going to be effective is to pool resources and to work together.

Endeley: Can I go to the first part about the extension system. It is true that the T&V system has some positive aspects in trying to strengthen the conventional agricultural extension system. But I don't think the World Bank should make it a recommendation for every country to adopt T&V. It will be helpful, if other international organizations can pressurize the World Bank not to make the T&V system a panacea for all extension problems facing developing countries. In Cameroon, the government has adopted the T&V system, but Cameroon adopted the system while restructuring its economy. It is a disaster to do both technical and financial problems. The system is capital intensive, and even worse, it was introduced when the Cameroon Government is facing a serious liquidity crises. I mean, before T&V works, you have to do a lot of modifications and adaptations for several years before it functions efficiently. The World Bank should be able to finance other systems of extension service besides the T&V.

Ehui: I have two questions. I think one was addressed to some extent, but I think it's quite important that we look at it again. When Wilfred finished his presentation he said that we should not generalize about Africa. Yet, in the beginning when we talked about the pipeline of technologies, a broad generalization was made that technologies are available for commercial farmers but are not generally available for small holders except high potential areas. That's not very informative, in my opinion. I think that it would be very useful to try to disaggregate again more by commodities and by agri-ecological zones. Depending on what we are talking about and where we are, the answer could be different.

Field: I want to support very strongly the first part of Simeon Ehui's intervention, that it is difficult to discuss availability of technology with the broad generalization that was made by this group. I think we should do it at a much more disaggregated level.

Secondly, Dick asked earlier about the apparent difference between my view and maybe what is coming out of this group. I think we should make a distinction between the pipeline and the stock of new technologies. My major problem is with the stock of technology. When you add what is in the pipeline, then you're looking at what you expect to get in the next five years, which we have done in our group already.

And then you have to make a distinction between the genetic technology, which we said basically is in the pipeline or available, and commodity/resource management technology, which we said is not. Again, you have to differentiate by agri-ecological zone, which we have done.

I'd like to clarify part of our group's report. When it came to economic reforms, we are saying that you need to create an environment to make technologies profitable. What policies do we need to be able to assist in making technologies adoptable by farmers when they do their calculus?

The question of seed multiplication is definitely an interesting one. Some members in my group felt it was a very important issue. In most cases we hope that will be an area of private sector involvement.

Mwangi: I want to finish by addressing a bit of the issue that Dick has raised, because I was also very much impressed by Peter's presentation about the currently available technology for particular farmers, for particular eco-regions. Listening to that I was wondering if we are talking about the technologies that are in the pipeline in the CG system? I think we need also to clarify what that is, because if they are only in the CG system, they will still need another step to reach the farmers. They need to be adapted to local conditions by the NARs.

Ackello-Ogutu: I would like to inject some formality into the argument. I think it's important for us to distinguish between economic profitability and financial profitability when we discuss whether these technologies are on the shelf and what are the constraints to adoption. A technology is economically profitable if its use contributes a positive return to the national economy, given the value of the scarce resources that are used in the technology. Financial profitability simply means that the technology gives farmers some profit, given the existing economic conditions. Farmer's adoption of technologies is likely to be a function of financial profitability. In other words, the more direct concern rather than technology's wider costs to farmers making financial profits but the rate of return to the national economy may be lower. I also think it is important institutional constraints, such as markets, roads, and extension services, separately from constraints associated with farmer specific attributes such as resource availability and risk aversion.

Staatz: We've been talking a lot about structural adjustment, which changes the divergence between financial profitability measured at farm level and national economic profitability. One of the key questions, it seems to me, is how, given all this change in the macro environment, you guide the research to something that's economically viable when you have such a long pipeline? It's going to take you ten years to develop a technology and you've got all the macro prices changing what's economically viable versus financially viable. I'd like to see a little discussion on that. Otherwise, we're in the position of saying well, we're going to have to change our macro policies to fit whatever technology we develop to get people to adopt it.

On Peter Matlon's point on the sharing of research responsibilities across small NARs which I agree with that, there is a real tough problem, and that's one of trust. Is, for example, Benin going to count on Togo to handle an important part of its research portfolio when it doesn't have control of those resources?

I know in the U.S., even with regional research amongst individual states in a federal system, it's very difficult, so that's a tough problem.

Martin: Let me ask one quick question of Dunstan and Simeon, perhaps this will clarify it. Given the economic and financial situations in, for example Zaire versus Cameroon, don't you think

that you're going to have very different adoption rates of the same agricultural technology even though the agri-ecological environment is similar?

Ehui: Of course the technology will need to be adapted to the country or the environment where it is intended to be used. What we are basically saying is that before we talk about adoption of a particular technology, we assume that the technology is appropriate. Now, what does it mean that a technology is appropriate? That means that it is technically feasible and economically feasible.

Chorus: No.

Martin: Because our group made the assumption at the beginning that we were only talking about the technical.

Ehui: We are researchers and developers of technology. Our goal is to try and sell our technology to the farmer. In that process, we find the factors that the farmer considers in deciding whether to adopt the technology or not.

I can see the argument about economic and financial viability. There's no question about that. But I think that at a minimum farmers make their adoption decision based on their own financial and risk analysis.

Spencer: The question was also directed to me, I think it is a good question. There are three types of considerations: technical suitability, economic viability, and financial profitability. The financial profit is what the farmer is going to consider when he or she is going to adopt. Economic viability is relevant for the society as a whole to decide whether that is the technology that is appropriate for that country. And to get economic viability you need to discount for subsidies, and use the border prices, and value all resources at their true cost to society. And finally you have the technical suitability, which is basically whether the technology will work in that environment or under the prevailing physical conditions of climate, soil etc.

If a particular technology package is not financially profitable, it cannot be adopted by the farmer. If it is not technically feasible, it is not relevant. So, the question is at what level you decide that a technology package is available or not for that system.

My definition, and what I have argued for in the literature all the time, is that you use economic viability to determine if technology is available. If a package is economically viable, it has to first of all be technically feasible. Policy is to remove all the distortions that cause a deviation between financial profit and economic viability. That's where your policy intervenes.

If this group was saying that policy should intervene to create financial profit for technology that is economically viable, I agree. But if they were saying, as it was stated; that economic viability

is a problem, then I don't think that policy is an issue. It is good that Jerry brought out the distinction between the economic viability and financial profitability.

The difference between the farmer in Zaire and in Cameroon might be due to distortions that have been introduced in Zaire, making a technology that is economically viable financially unprofitable.

Martin: We agree.

Pricing and Marketing Policies; Session 2, Group 1

Objective: To identify the most strategic pricing and marketing reforms that will promote agricultural transformation and a sustained agricultural growth rate of 3% or more.

Suggested questions:

- 1) Have structural adjustment reforms been effective in promoting growth of the tradable agricultural sector?
- 2) Is fertilizer marketing and pricing a strategic constraint to agricultural growth?
- 3) How can policy reforms promote increased linkage between consumer demand and agricultural supply?

Discussion of Question 1

Structural adjustment programmes (SAPs) usually have included three components:

Changes in pricing policy, typically linked to devaluation of the domestic currency, aimed at increasing the domestic value of tradables relative to nontradables.

Changes in marketing policies, often associated with the reform of parastatals. These reforms, frequently including liberalization of food crop marketing, often result in changes in relative prices between cash crops and food crops.

Changes in government investments, associated with budget austerity and the restructuring or elimination of organizations (such as marketing boards) previously charged with collecting the revenue for, and making the physical investments in, market supporting services and infrastructure.

The group believed that there was empirical evidence of short-run (18-24 month) supply responses for export crops in several African countries that have undertaken SAPs. These supply

responses appear to be in response to the increased value of tradables resulting from devaluation of the domestic currency. Examples mentioned included cocoa in Ghana, Nigeria, and Cote-d'Ivoire; groundnuts in The Gambia; and tea and coffee in Uganda. These increases in production were in part due to more efficient management and harvesting of perennials and some possible area expansion of annuals.

However, the group felt that the empirical record was less clear concerning the medium to long-run impact of structural adjustment on the production of tradables due to the possibly offsetting effects of factors (b) and (c) outlined above (that is, changes in relative prices of food and cash crops due to changes in the marketing system; and reduction in investment in market-facilitating services and infrastructure). The situation in Nigeria was again cited where with the abolition of the cocoa marketing board, there has been a deterioration in rural infrastructure, quality control on cocoa, and a consequent shift back to food crop production by many farmers.

Given that the empirical record on the long-run supply response of tradables to SAPs appears ambiguous, the group identified this as a high-priority area for future research. Such research should focus on the interaction among the three components of the SAPs outlined above on supply response and on ways of designing the SAPs in a way that these various components don't work against each other. For example, are alternative ways of dealing with budget austerity without drastically cutting market facilitating services? What is the potential supply response to changes in these market facilitating services?

Discussion of Question 2

The consensus of the group was that it will be impossible to increase agricultural production in sub-Saharan Africa at 3% per year on a sustained basis without increased use of fertilizer. Indeed, some argued that without greater fertilizer use, in some regions there will be greater resource degradation. Increasing population pressure in the face of stagnant yields will result in cropping being pushed out onto more fragile lands.

But having said that greater fertilizer use was needed to boost production, the group felt that the constraints to increasing fertilizer use were not always on the supply (marketing) side. In analyzing the question, it is important to disaggregate by agro-ecological zone. The group felt that in the humid and semi-arid zone, low fertilizer response of existing sorghum and millet varieties and risk resulting from erratic rainfall severely limit the effective demand for fertilizer. In the humid zone, demand for fertilizer is limited because high levels of fertilizer use lead to severe soil degradation (changes in soil PH, cation exchange capacity, and reduction in organic content) given current soil management techniques.

In the savannah and highland zones, effective demand often does exist for fertilizer at unsubsidized prices, and marketing constraints may limit fertilizer use. For these regions, reforms in fertilizer marketing (such as allowing the private sector to play a greater role) may have high payoffs.

Evidence was cited for the Kenya highlands of the expansion in available concerns were still expressed about the long-run effects of greatly expanded fertilizer use on the sustainability of the production system.

Discussion of Question 3

Policy reforms can lead to improved linkage between consumer demand in both the short run and the longer run. In the short run, these reforms (such as the removal of movement controls) permit better transmission of consumer demands to traders and farmers. This leads to shifts along the production possibility curve to a more efficient mix of output.

Over the longer term, these policy reforms can increase supply by making rural food markets more reliable. More reliable food markets, in turn, can encourage farmers in zones not particularly well suited to staple crop production to specialize in producing other commodities. Without reliable rural food markets, farmers often are compelled to assure a large proportion of home consumption through own production, thereby foregoing gains from specialization.

In the long run, reforms aimed at making agricultural research systems more demand-driven can also help provide a better link between consumer demand and the types of new technologies generated by such systems.

The types of reforms particularly useful in promoting these increased links between consumer demand and agricultural supply include removal of movement restrictions, both within countries and across national borders; reform of marketing boards (shifting government actions away direct trading to provision of market facilitating services); reduction in barriers of entry to agricultural trade; and promotion of small-scale enterprises that add value to agricultural products.

Non-Price Constraints on Agri-Business; Session 2, Group 2

Objective: To identify strategic factors which inhibit the growth of agribusiness and limit the effectiveness of agribusiness in contributing to agricultural transformation and rapid growth.

Suggested questions:

- 1) Have structural adjustment and other recent reforms been effective in promoting a dynamic agribusiness sector?
- 2) What are the main limiting factors on the growth of agribusiness activities?
- 3) Which types of agribusiness activities are easiest to develop and which are most difficult?

- 4) What policy and institutional reforms are most needed to promote further growth of agribusiness?

The group started by tackling the definition of what should be included in agribusiness and trying to relate this more closely to the main theme of this symposium, agricultural transformation. We decided that it would be useful to enlarge the discussion to address non-price constraints on the commercialization of agriculture.

So, the four questions which were handed to us, and also the main objective were all rephrased or restated to comply with this change. The objective was to identify strategic factors which inhibit the growth and effectiveness of commercialization of agriculture.

In this connection the first question is the impact of structural adjustment and other recent policy reforms on the commercialization of agriculture. The second one is the main limiting factors on the development of commercialization of agriculture. The third one is the types of activities which are easiest to develop or most difficult to develop. And the fourth question was to list recommendations for policy and institutional reforms that would promote the commercialization of agriculture.

Discussion of Question 2

I'll start with the constraints we identified.

The first category is related to infrastructure, more specifically the lack of investment in the infrastructure, such as roads, communications systems, and services.

The second category of constraints was institutional factors to support the flow of resources into agriculture. Issues here included the weakness or the complete lack of trading systems, institutions for mobilizing savings and lack of collateral to get access to loans.

The third category of constraint relates to the regulatory environment effecting trade and production. These constraints can be on the bureaucratic side, such as requirements to enter business or movement restriction on commodities either between regions within the same country or between countries. Also, you have trade barriers and the tough question of contract enforcement, which raises the issue of transaction costs.

The fourth category or factors are social factors with the special mention of gender issues.

The fifth category of non-price factors constraining the commercialization of agriculture is the lack of business knowledge, the lack of general knowledge of how to do business in a more formal environment, and how to get information. These are problems of human capital.

The sixth category of constraints relates to technology, appropriate technology for some of the activities, both at the production level and beyond. Those constraints could be linked to the availability of technology, the knowledge of the existence of the technology and how to use it, as well as access to the technology and access to the inputs that would be required to implement the technology.

The seventh category of non-price constraints is the macro-policy environment, including trade regimes. One aspect of this is the difference or the disparities in macro policies between countries. In the case of West Africa it's very important, because you get regional trade not based on reasons of comparative advantage, but based on the exportation of rents, rents created by disparities of macro policies between the different countries. There is also the problem of currency, the inconvertibility of currency.

The last category of factors that we identified relate to institutions and risk, risk at both the production level and the trading level. Those risks mostly have to do with the difficulty of enforcing contracts, of getting clear property rights, or simply getting market information. In some countries in West Africa where there have been some marketing information systems being implemented for the past four or five years we have seen the impact of this type of information in reducing the level of risk for traders.

Discussion of Question 1

With regard to the impact of structural adjustment on the commercialization of agriculture, we had basically three observations. It was not actually an impact assessment, but more of an appreciation of some of the things which have happened. First we observed that there has been a differential application of structural adjustment policy reforms across countries. For example, in the Francophone countries of West Africa, the application of social adjustment has been completely different from what it is in Anglophone countries. In fact, in this respect adjustment has been more effective in Anglophone than the Francophone countries.

The second observation was that although we cannot say that structural adjustment has promoted or constrained commercialization of agriculture, we can at least say that adjustment in most countries has dealt more with account balances at the state budget level and also has promoted equilibrium of prices at the level of market. Programs have not dealt with non-price factors like investment in infrastructure. Structural adjustment has, almost as a by-product, illustrated the centrality of non-price constraints.

The third general observation about the issue of structural adjustment is that the measures have required cuts in government spending. As a result, governments have had to restrain investments and to limit credit and financing for investment.

Discussion of Question 3

Finally, we asked which are the easiest activities or the most difficult activities to develop? It is very easy to answer that one: It depends. We thought it would be useful to go directly to some of the policy reforms or institutional reforms that we think might be needed to promote agricultural commercialization.

Discussion of Question 4

Among those reforms the first category deals with legal institutions to support commercialization, including contract enforcement, and here the definition of property rights.

The second category is a targeted set of investments and policies to reduce the costs of distribution because in some cases, you can find that the cost of moving commodities beyond the farm gate to the consumer represent more than 50% of the final price of the commodities. Transportation alone can account for up to 70% or even more in the Sahel region for certain commodities. Unless we reduce those costs, it's going to be difficult to promote the commercialization of agriculture.

The third category of reforms that would be needed is related to the elimination of red tape. Remove all of the costly barriers to trade and the costly barriers to simply getting the status of a trader or a businessman.

The fourth one related to the promotion of trade associations to provide support services for traders, services from which the government has withdrawn. Such associations would also provide some possibilities of pooling business knowledge and also easing contract enforcement.

The fifth category dealt with the development or simply the creation, in some cases, of credit and banking institutions for investment.

Export Agriculture; Session 2, Group 3

Objective: To determine appropriate role for export orientation in agricultural transformation and a sustained agricultural growth rate of 3% or more.

Suggested questions:

- 1) Should export agriculture play a leading role in agricultural growth?
- 2) Does the promotion of export agriculture conflict with or complement other important agricultural sector goals?

- 3) Identify the 5 most important and appropriate policy/institutional reforms required to promote further growth of export agriculture?

Discussion of Question 1:

The group began by discussing whether or not it was appropriate to disaggregate this question by agro-ecological zones, large versus small holder agriculture, or other divisions. The consensus was that no disaggregation was necessary, and that we would discuss the issues in general terms.

The group began by accepting the idea that export agriculture should continue to take the lead, but that it is essential to diversify away from traditional exports where alternatives non-traditional exports exist. Yet, upon further discussion in which several negative examples of countries that had been hurt by export reliance (particularly the historical reliance on mono-crop exports such as cocoa, and the damage to domestic cotton production caused by the importation of used clothing from Europe), the group moved towards a more negative view of the role of export-led agricultural growth.

Although there was some sympathy for an import-substitution strategy, the group finally reached a consensus that the role of export agriculture should be guided by the principal of comparative advantage. It was noted, however, that comparative advantage might lie in domestic food crop production, which would tend to de-emphasize the role of export crops.

Nonetheless, it was also noted that the ability to earn foreign exchange is essential for both agricultural and economic growth. While in general the group preferred not to rely on export agriculture, it noted that countries with no capacity to earn foreign exchange from non-agricultural activities would be forced to rely on export agriculture.

In all cases, the group felt that greater priority should be placed on promoting intra-regional trade within Africa, though existing trade linkages on that level are poor.

Discussion of Question 2:

Before discussing whether an export-led strategy conflicts with or complements other agricultural sector goals the group decided it was important to enumerate those other goals. The list included: 1) food security (as distinct from food self-sufficiency), 2) employment generation, 3) national income generation, 4) diversification, 5) equity, and 6) support for agro-industrial development.

The group's intention was then to address each of the goals vis-a-vis export-led agricultural growth, though this proved impossible.

With regard to food security, the group accepted evidence from an IFPRI study in Kenya that showed an improvement in food security resulting from the production of sugar. There was no consensus, however, that this complementarity would exist everywhere.

There was significant concern with potential conflicts between the objective of attaining a 3% growth rate (whether through an export-led or through an import-substitution strategy), and equity. The principal of comparative advantage in itself says nothing about equity. Indeed, it was felt likely that comparative advantage would lead to high-potential areas being favored over low potential areas. The group thus felt it important that special attention be paid to identifying the left out groups and guarding their welfare.

A distinction was drawn between theory and practice as regards conflicts between export-led growth and these other objectives. Theory tends to favor the export strategy, the experience of Nigeria, among other countries, was that rent-seeking practices, declining international terms of trade, and other factors often undermined exported strategies.

In general the question of whether these conflicts exist was taken to depend first on an objective analysis of where comparative advantage lies. Thus, an analysis of the conflicts depends on the particular circumstances of the country.

Discussion of Question 3:

The group framed the question as being how to promote agricultural exports, without necessarily making exports the leading effort. Rather than choosing five actions, the group listed ten, including:

- 1) policies to promote diversification to non-traditional exports
- 2) policies to promote agro-processing and value added opportunities
- 3) institutional change to identify crop and livestock systems with the highest comparative advantage
- 4) increase the level of investment in the agricultural and livestock sectors and related infrastructure
- 5) reorganize the agricultural research system to export crop production
- 6) improve information management, particularly with regard to sub-regional markets
- 7) create and maintain comparative advantage

- 8) promote intra-African trade by forming trade blocs based on economic relations
- 9) harmonize tariff and non-tariff barriers across trading partners
- 10) exchange rate reform (especially in the CFA zone) to promote trade

Plenary Discussion

Deng: Now, let us now go back and discuss the reports of the groups as they were presented.

Staatz: When we were looking at the three typical effects of structural adjustments, the changes in prices of tradable versus non-tradables, the food versus non-food, and changes in investment, one of the things that we highlighted was the lack of empirical knowledge on how those three factors typically have interacted, whether they work in concert or against each other. We identified that as a major area for further empirical research, particularly the question of potential supply response to these non-price factors, such as changes in infrastructure.

Hakizimana: In this symposium we have been using 3% for agricultural growth rate, and in some regions of some countries, like Burundi, for example, where I'm from, the population growth is almost 3%. That means that what is produced is being consumed theoretically, so there is no surplus. Agriculture can not produce funds for reinvesting in the agricultural and other sectors, so I think that the 3% that is too low.

Monke: Just to follow up on John Staatz' point about empirical research on the impacts of structural adjustment. The impacts of the exchange rate reforms are quite predictable and similar across countries, but the impact of changes in public expenditure are not predictable, because changes in public expenditure or the patterns of change are quite discretionary. Some countries will reduce investment in roads, other countries may be able to reduce expenditure in other ways and maintain public investments. So, that's where we see the need for a lot of careful empirical research on the impacts of structural adjustment.

Staatz: There was a lot of debate in our group about what appeared to be ambiguous empirical results across countries on the effects of the structural adjustment programs on tradables. We identified that typically the structural adjustment policies have changed the relative prices of tradables and made them more expensive relative non-tradables in terms of domestic currency, which has had some short-run effects on promoting exports. However, there were possibly counteracting effects. For example, as you change the structure of food crop marketing through liberalizing of marketing boards, that may have some counteracting effects of raising food crops prices relative to cash crops. The third effect was with government austerity and the restructuring of some of the boards and some of the other organizations that had previously been charged with extracting some of the surplus in cash crops to reinvest in infrastructure. At times there has been a fall in the

investment of the supporting services, so you have three factors that are not always working in concert. The question of how those three factors balance out is what determines the long-term impact of structural adjustments on tradables.

As Eric mentioned, there are many ways in which governments can adjust their investment, or deal with the budgetary austerity, and we felt that was an area for further investigation. The objective is to get all three of these factors working in concert rather than in conflict.

Ikpi: I appreciate what John just said. From my understanding of what structural adjustment is supposed to be, I would say that structural adjustment is going the right way to lead to agricultural transformation. The intended short-run effect of austerity programs is to change our consumption patterns, to make us suffer now as a generation so that future generations will get increased production, maintain stabilized prices, and, therefore, make things easier for them. So, in that respect I would say structural adjustment is definitely leading to proper agricultural transformation within the African continent.

Gitu: For the case of Kenya, the reduction of government investment in parastatals has actually had desirable changes. A study that was done in the Ministry of Planning, looking at some of the changes in public investment indicates that prices in some areas actually are falling, so that even the question of short-term pains for long-term gains really is not indicated in here. There are actually some of the changes that you will make in public investments that will accrue very short-run gains in this case.

Spencer: I am not a macro economist and I would not dare to argue with macro economists, but I sometimes like to jump into deep pools even though I cannot swim!

There is no one tree or a couple of trees that make a forest. So, we have to move beyond looking at single effects. Structural adjustment leads to short-term benefits, but you cannot stop there.

What I was pointing out is what I have seen. For example, in the cocoa belt in Nigeria it is clear that what is happening now with structural adjustment is that there has been disinvestment in cocoa production. Cocoa prices have gone down to the farmers. They have moved their cocoa trees to plant food crops. The farm-to-market roads which were maintained by the Cocoa marketing board are no longer maintained, transportation costs have gone up significantly -- not just because of changes in the prices but because the infrastructure has deteriorated and it is more difficult to get in and out of these areas. The inputs which were available and supplied, like the sprays for the cocoa trees and so on are no longer available.

Now, there are obviously a lot of other factors that are operating. For example, the world market price of cocoa has been going down, so you ask questions: What are you liberalizing for if you are going to increase supply into a declining world market anyway? What are the benefits? There are crop substitutions which might be good or might be bad.

When I start to ask what empirical evidence we have of the farm level effects of structural adjustment, you have come up with only one or two case studies. We need a lot more information on what is happening.

Goldman: The first day somebody mentioned the World Bank's studies, which tend to show that countries which have been "adjusting" are also having relatively better agricultural sector performance, and there was some casual skepticism expressed about that.

I would like to see further discussion of what your sense really is, because I get the sense from the discussion that's taken place so far that the Bank's data may be in fact correct: that in the short-run the aggregate agricultural sector data is showing better performance in adjusting countries than non-adjusting countries. This does not necessarily mean that is going to be a sustained feature, but at least we should try to determine whether we think the macro data in this case seem to be consistent with our own perceptions.

Secondly, we've talked a little bit about what happens when tradable prices go up and everybody seems to agree that at least when there has been a nominal devaluation in most of your countries the prices for tradable agriculture go up. Yet, some of you have suggested that for some reason the relative export price -- Nigeria and cocoa was the specific example relative to food prices -- may not go up. Food prices may go up faster than export prices and you may not get the export response you want.

I'd like to have us think a little bit about a couple of things. One is that food crops are not necessarily non-tradables. We all know there is an increasing import dependence in the food sectors in African countries. So, if we see an increase in food prices at the farm gate relative to say, cocoa prices, that may not necessarily indicate to us that tradable agriculture is not being stimulated.

Let's say that the price of tradables at the border goes up, as part of structural adjustment, but that the fiscal contraction leads to a deterioration of public investment and infrastructure, which I think is Dunstan's example. Then what you may have, and this is also Dunstan's example, is the price of tradables going up at the border and the price of tradables going down at the farm gate. That's a bad situation. On the other hand what you may have is the price of tradables going up at the border and at the farm gate for the export crops. Also, as a part of structural adjustment, marketing reforms should lower the marketing margins for food crops, which will then raise the price of the food crops at the farm gate as well. So, you may get a relative price change which favors food crops. But that's a good situation. So, those are two different structural scenarios.

Do we think that there are important examples of the good structural adjustment as well as important examples and lessons we need to learn about the bad structural adjustment?

And if we are getting positive supply responses, what is the source of it? Because that will determine whether this is the beginning of a long-run transformation, or simply a readjustment of the current stock of resources. Are we talking about land or labor shifting from one type of agriculture

to another? Or are we talking about incentives and marketing changes that are leading to more fertilizer, more institutional changes for seed development, etc?

Dapaah: I think Ghana has had a much longer period than most countries in terms of structural adjustment. So, what I'm going to say pertains to Ghana, and if there are lessons to learn, that's fine. We have had major currency devaluations. Over a period of ten years we have moved from 2.75 cedis to the dollar to 601 to the dollar. Now, if you call that devaluation -- (laughter). If that is called devaluation, well...I'm sure not too many countries can have that kind of huge change in exchange rate.

But what it has done has really changed the equation. Agriculture was on average growing at - 1.2% per annum. Since the structural adjustment, on average, agriculture has grown at about 2.1%

Somebody referred to cocoa. At the time of the structural adjustment cocoa production had fallen from about 600,000 to 158,000 tons. Since then it has gone back to about 300,000 tons and it has more or less stabilized at 290, 300.

You see, I think the difficulty is that structural adjustment is not the same everywhere. What portion of the package is implementable will differ from country to country. So, the fact that there is a structural adjustment package doesn't mean that you can expect A, B, C, D results because it depends on a whole lot of other factors. And there are other things that should accompany structural adjustment. As part of the structural adjustment program we put together an agricultural strategy and under that strategy we had a number of projects that were designed to address this investment problem.

As part of the medium-term agricultural development package we've had six projects. One is an agricultural research project to try and revamp the research stations, increase the operational funds to carry out the research and so on.

We also have an extension project with a T&V component. We are in the process of rationalizing the extension system. We also have had an agricultural sector investment project. Now, this project is specifically targeted at rural communities, allowing them to identify public investment projects that will enhance their capacity to increase their production. But they will do the project identification and prioritization.

Also as a result of this medium term agricultural development program, we were able to link up with roads and highways to support what we're trying to do in agriculture. We also have a livestock project, and as of now, there is a seminar on a fisheries project, which is one of the last of the project in that package.

Now, over the structure adjustment period, 1983 to 1992, our GDP growth rate has been about 5%. What we are looking for now is to see if with all these projects, which are designed to

address the adverse impact of the initial structural adjustment, it is not possible to move to double-digit growth. We have targeted 8% to 10% annual growth between now and the year 2000.

The implication for agriculture is that we are now going to try to move from the 2.1% to 3.7% annually. So what I'm saying is that we need a much longer horizon to enable us to begin to address the other problems. So, this is the Ghana experience.

Spencer: I think that was a very interesting and lucid presentation. There's one piece of additional information some would like to have. What is the debt service ratio? What has happened to your debt service ratio over time in this period?

Dapaah: At one point it got to as high as 70% Now, it is about 30% of exports.

Spencer: Has that been due to refinancing?

Dapaah: It is due to a number of reasons. One, at the time of the structural adjustment program we had \$600 million of overdue debts to be serviced. These have finally been paid off. At the initial stages we were not getting those concessionary long-term, low interest rate, fifty-year-type of ideal soft loan. Since adjusting, there has been increased credit flows. It's now easier to attract those long-term concessional ten years moratorium type of loans.

Spencer: I think no other country that has been adjusting has been able to attract the foreign resources that Ghana has been able to. That might be because Ghana is doing it so well, much better than the other countries. But the question is whether there are enough foreign resources that are going to be available to support an adjusting country over time, as has happened in Ghana.

Block: I have a small piece of empirical evidence that I want to throw out. A recent World Bank report on the effects of structural adjustment on African agriculture distinguished between three groups of countries, which they called intensely adjusting, other adjusting, and non-adjusting countries. The definition had to do with the number of adjustment operations and when they started. It's a loose categorization. I took those groups and I looked at two pieces of evidence, comparing the late Seventies and early Eighties with the mid-1980s. In terms of real exchange rate depreciation, the intensely adjusting countries had much greater rates of real depreciation in their exchange rates: something like 58% as compared to the earlier period. The middle group had only 26%, and the non-adjusting countries only an 11% real depreciation.

Then I went back to the agricultural productivity measurements which I presented to you the other day. It turns out that from '78 to '83, that is prior to widespread adjustment, there's really very little distinction in the factor productivity growth rates across these three categories. TFP was increasing at roughly .5% per year for each group of countries. But it turns out that from '83 to '88 the intensely adjusting countries had agricultural factor productivity growth rates of 3.2% The other adjusting countries had growth rates of 2%, and the non-adjusting countries had -.7% The standing covers about 25 countries.

Delgado: I'd just like to build on what some previous speakers have said. I agree very much with Wilfred; we have to look at each case, because each case has a lesson, but the lesson's are a little bit different.

My own view is that Ghana is very close to the mind set that existed at the time the Berg Report was written as to what the problem was with regard to the structure of Ghana: its size, the way that it earned foreign exchange, and the sorts of policies that were being followed. In fact, structural adjustment in Ghana really was the test case of the structural adjustment model. I'm delighted that it's doing so well. I suspect that where the sectoral policies come out on transport and fertilizer, and the specific follow-up policies to macroeconomic structural adjustment will have a lot to do with the long-run success or failure of the experience.

Now, the Nigeria case was mentioned, and that has a slightly different lesson. It's a much larger economy, with very large mineral rents in the background. Nigeria has specifically opted for a high relative food price policy, and that was the specific choice, as I understand it, of the Nigerian leadership, which had a low view of export crops and what they could do.

My guess is that if oil were not there, Nigeria would be in very bad shape. I mean that high food prices have been implemented primarily by a series of sectoral policies. It is true that there are large sections of tradable agriculture, but there are countervailing the sectoral policies that are exactly contrary to the structural adjustment policies with respect to food in Nigeria. As much as the macro policies have made the tradable sector competitive for export in Nigeria, sectoral policies in the opposite direction have done everything possible to make Nigerian tradables non-competitive, which is one reason for some of the perverse trade flows with the neighboring countries.

Now, Senegal is another case, with another lesson that is very interesting. It is a case where over a long period of time the conditions requiring adjustment built up, and like most countries sectoral policies were brought piecemeal to try and mitigate the impact of the overvalued exchange rate and the other distortions. Senegal is not adjusted yet, but when it does the farmers may not see too much difference, because in effect partial devaluations have already occurred through sectoral policies. The State, and in the back of the State there's France, has been subsidizing peanut products exports, which is the main exportable, and the State has been taxing rice imports. That's a partial devaluation based on two crops and sets of actions: the farmers who consume rice and export peanuts. Of course the whole economy doesn't work that way.

The point I want to make here I think is fundamental for looking at the impact of structural adjustment. When structural adjustment occurs, a lot of other countervailing subsidies and interventions will change at the same time, because the unsustainability of these sectoral policies is what is forcing the change in structural adjustment

Matlon: Could I make a suggestion? I found this morning session to be one of the most interesting in the last couple of days. We've gotten into some hard information on a case study basis, we're beginning to see some patterns forming, and Steve has given us a review of some aggregate

data. Could I suggest that maybe U.S.A.I.D. and H.I.I.D. should consider continuing these meetings annually. An excellent focus next year might be to allocate three days specifically on structural adjustment, where we could bring in authors of some of the World Bank studies, some of the U.S.A.I.D. studies, and some of the work that Steve reviewed briefly.

You might also want to see if it's possible to contract individuals in countries who have various categories of the structural adjustment process to present uniform case studies using a common methodology, looking at common indicators. Not only looking at the broad macro-economic variables, but also looking at issues of distributional equity, and social indicators as affected by fiscal reform.

Monke: I was interested in the discussion about structural adjustment and thinking about a lot of the very stimulating ideas that came out of the earlier discussion about structural adjustment this morning. I wonder if there's any empirical evidence or ideas or thoughts among the group on non-price constraints as to the impact of structural adjustment on private investment?

It's been suggested that physical austerity has reduced public investment and hindered the expansion of output. But has agribusiness been encouraged in any way? Has agribusiness come back with private investment, either domestic investment or foreign investment through multi-national agribusinesses? And in what commodities has this investment occurred?

Endeley: In the group, we found that the structural adjustment program created a need, and tried to foster private sector development of agribusiness or micro enterprises. Yet, the infrastructural facilities such as organized market, transportation and roads to boost these new interests and opportunities were lacking. In addition, there are problems with our financial institutions and policies that affect tariffs, taxes and business operations which structural adjustment did not address in many countries. All these problems slowed down the rate at which private sector investment could have occurred.

It would be nice for donor institutions to really strengthen local groups known to provide grassroots services. Also important, is the protection of minority groups because it's very easy for us to develop the private sector in such a way that it's the big guns who control the private sector.

This situation will only lead to further widening of the socio-economic gap between the rich and poor.

Staatz: Eric has underlined a very important point that I think cuts across all three policy presentations, and it's related partly to a point that Chris Delgado has made many times, and that is if you're going to get any sort of structural transformation you need to mobilize private investment, and that private investment is largely going to be made by small farmers, traders, etc. I would really like us to try to focus a bit on what has been happening to the mechanisms and the incentives for investment as we go through either structural adjustment, or trying to take advantage of, comparative advantage. There are one-time rents that are available. How do you take those rents and productively

invest them, so you get a growth spiral going? I'd like to hear us talk some more about that, and perhaps link that to some of the changes going on in accountability, in governance and so forth, that effect incentives for investment.

Hassan: To respond fully to that question, I think that it will require that people consider seriously the proposal by Peter that we have a conference specifically on that topic, for which people prepare research papers in advance. I have to ask Gitu here from Kenya if he has data whether private investment has increased or not.

I don't have data but I can tell that the very recent reforms that have been administered by the government of Sudan, in spite of their bad human rights record, have at least been consistent with recommendations of the World Bank and IMF with respect to structural adjustment programs. I have seen substantial private investments going into agriculture in the last two years. I don't have the data, but it is very clear that private money is going into agriculture, especially irrigated, smaller scale agriculture, a mixed type of farming in the urban outskirts.

Martin: I wanted to give an example that I'm familiar within Madagascar. I think that it's easy to tie these changes to a very specific case where parastatals have been removed from the marketing and processing of rice in Madagascar. One of the things we've noticed and documented over the years is the number of small rice mills that have been imported into Madagascar, and the number of small millers who have sprung up around the country who have changed the whole structure of rice processing in that country. Along with that has come a large increase in the importation of small pick-up trucks, which are also associated with the movement of small quantities of rice.

We've also done fairly extensive surveys of rural markets throughout the country, and been able to document an increase in the amount of inter-regional trade and back trade, which up until 1985 had been forbidden. So, you're beginning to see the movement of rice to deficit areas, and from those deficit areas the movement of things such as bananas and other commodities back through the capital. And most of that is being done by small and medium-sized traders.

You've also seen some of the larger-scale rice mills being purchased by Chinese traders, indigenous Malagas-Chinese traders, who are getting a lot of money out of Hong Kong and Taiwan. Up until the structural change, this had not occurred. It's also, very difficult to document the investments that are being made outside of the rice sector, because the rice sector was the one that was the target of the structural adjustment. So, I think the next challenge is to try to get a sense of what's happening to other crops that may not have been dominated by state enterprises.

Armstrong: To follow up on Jerry's point, if you'll go back ten years, you'll see that what Jerry's describing is a return to the pre-revolutionary situation. You're going back to a trading pattern that had existed in the past and people were familiar with it.

In other countries, where you've had a predominant central single marketing channel, where you have never had, or for a much longer period of time you haven't had that kind of a history, the question becomes what kind of entrepreneurial skills have to be developed among individual traders. Here in Zimbabwe, for example, they've just started to open up things here, but there hasn't been that tradition of small scale movement for a longer period of time.

Hassan: In the Breckart group we concluded that non-price factors were considered in structural adjustment program, but that priority was given in implementing the price reform components of the programs.

The non-price factors were given probably lower priority, and in the process of reforming the price factors, the role and importance of non-price constraints have emerged more clearly. They were not left out or anything, but they were not given sufficient priority in implementation.

Goldman: Can we put the question the other way around? Is it a problem of sequencing? If you were asked to design a structure adjustment program for a country which is entering the process for the first time, how should we sequence the reform measures? Maybe some of the lessons we have to learn from the adjustment that has taken place so far pertain to the proper sequencing of reforms.

Gava: It has been brought forth that maybe what is important is to lay the foundation of this program by involving as many people as possible in the community to discuss it. It can enhance the credibility of the program if it is not taken to be a government program, or a World Bank or IMF program.

Uganda is one of those countries where we had a response in the short-run. But we've run into some problems, as our agro-industries develop. One of them is land. These industries need to be situated somewhere. If you are saying you're going to build an agro-industry or a factory somewhere, you must have land. So, then the issue is who should own the land? Do you have the land? The land tenure issue is another very big problem in Uganda. We have a problem of deciding who is a Ugandan, and if you are not a Ugandan, should you have land?

Another problem has been the availability of credit for many of these industries and the commercialization of agriculture. You need capital. Of course, in most cases people say that there's a lot of saving in agriculture, but that is in a form which cannot be used to establish these industries.

So, I think as we move on, the building of micro industries is the next stage. First, you have this excitement, where the prices are good for the farmers. But then those who want to reinvest in agriculture face other problems.

I don't want to cite the many issues, the many problems we've had in Uganda. As I said the broad term was credibility: How do you enlist everybody, so that we accept whatever comes with it afterwards. I think that's the most important thing.

Magagula: I don't think the group really would be so presumptuous as to provide even a blueprint for sequencing structure adjustment programs.

I think that what the group is saying that in most cases where structural adjustment programs have been undertaken, the emphasis has been on price issues, to restructure the price regimes, the exchange rates and so forth. It is certainly a necessary condition for adjusting. But we are saying it is also not a sufficient condition. Where adjustments of prices and exchange rates have not been successful, you'll find that it is where non-price constraints have become very visible. In most cases non-price constraints have in a way constrained the emergence of the private sector or micro enterprises in agriculture.

So, I think really the message from the group is that, as Mrs. Gava has indicated, discussions must be democratic. Discussions leading to structural adjustment programs must be democratic. I think those people who champion these programs must not be satisfied with limiting negotiations to the capitals of these countries, but must go beyond that.

Delgado: There's one set of common issues, it seems to me, that needs looking at to answer your question on sequencing, which is that in many cases, one would expect that the immediate results of structural adjustment measures would lead to a decrease in government fiscal resources, because many of the conditions are designed to decrease taxation in the tradable sector. And second, because in fact there is a large tradable component of food, one would expect that food prices would go up.

Now, both of these go against the very important political consensus points that Mrs. Gava raised, and that seems to be so central to looking at successful cases of structural adjustment around the world.

In some cases adjustment may also work, at least in the short run, against diversification, simply because if people are spending 75% of their incomes on foods, or 50% of increments to income on food, food price increases will have quite an impact on labor and thus on cost of production generally.

I think that the question is how to target vulnerable groups affected by rising food prices. What role can donors play either in assisting with targeted programs to help the most vulnerable groups to get through the adjustment process and to deal generally with the fall of fiscal resources. I understand within the World Bank that this is one of the major issues: how do you actually promote the kinds of structural promotions one wants when governments are having to give up their traditional sources of revenue at the same time when donors are beginning to retrench?

Martin: Yes, I wanted to follow up on what Mrs. Gava said, because I think it's extremely important. I'd be willing to go out on a limb and say that there are ways to sequence reforms that need to be followed as we move from policy reform to policy implementation, and actually dealing with the consequences of these policy reforms. We have to start to define the appropriate role of

government in this new environment? One issue is land tenure and all those other elements that are associated with providing a sense of security to people who are going to make an investment in agribusiness. That extends, of course to other legal issues as well. I think that legal reform, and some sense of surety on the part of investors, be they investors on their own countries or foreign investors who are coming in and linking up with national investors is essential. Let's face it, people who are going to make investments have alternatives. They need to have an adequate level of security.

Likewise a multinational also has a number of options, as we saw in the proceedings from the Winrock round table: the larger firms, they can go to Asia, they can go to North Africa, they can go to Latin America. African governments and African business people have got to make the environment attractive to them by reforming conditions relating to regulatory reform, anti-corruption programs, and legal security of land. All those things are the next logical steps from policy reform that we have to proceed with.

Deng: I know Gitu, you are going to respond to Glenn's question, but let me put the question which I want you to answer also in the group. I think there's current thinking that implementing a successful or sustained adjustment program may not be viable in a democratic system, compared to a dictatorship. We still have many one-party states here in Africa.

So, I think Madame Gava and Glenn have raised some important questions, regarding popular participation in adjustment.

My other concern involves the intellectual ownership of the adjustment programs. The ownership is not really open to the public. The ownership of the program requires the involvement of national intellectuals in the design and implementation. They will often be the ones to say, ah-hah, wait a minute, if we do this, even though it makes sense from the economic point of view, you may not be able to sell it politically, and they jeopardize the adjustment.

Gitu: I am sometimes very amazed when somebody refers to an African government and says that we need to be democratic to decide. Actually, with structural adjustment, it is very difficult to decide democratically because there are so many problems.

Number one, if you look at the price and marketing systems, they're totally bad.

Number two: if we are going to solve some of these problems, we have to be somewhat dictatorial. Take the example of civil service. In Kenya, we have refused to change the civil service. We have too many people in the civil service, and the government is saying, no to the World Bank's telling us to retrench. After all, we are sovereign. But we want loans. We want grants. So, I would like to disagree with my friend from Swaziland; we need some level of dictatorial rule in instituting some of these measures.

Another point is that once you institute a project or a program, you must also think about the vulnerable group. What we have done in Kenya, which is very wrong, is we have accepted some of the structural adjustment programs, but we never thought about the impact on the vulnerable.

We are actually having an adverse impact on the poor. How do you start a structural adjustment without even simulating some of the impacts? I think we need to do more studies before we actually accept reform programs.

And the last thing, when a man is poor, he has to accept money from donors. Sometimes we accept money from donors for nothing. We don't even know what is the impact of the money we receive. Let's say you give me \$2 billion and I squander \$1.5 billion. When you measure the impact of the \$2 billion, you're really only measuring the impact of \$500 million.

Magagula: I really don't think there is much of a difference between myself and what Dr. Gitu has said. I think really he is reinforcing the point I have made that donors should not be satisfied with the discussions that they have in the capitals.

Now, what you're saying, Dr. Gitu, is a bit ironic in that you insist that donors must be satisfied with discussions with what you consider to be corrupt governments. The mere fact that the governments don't take into account the social effect of structural adjustment is because they have no sensitivity whatsoever to the impact of such adjustment on vulnerable groups.

That's why I say look, maybe the discussions should be extended a bit to cover the views of those individuals who are not in government but who in the final analysis will be directly affected by the structural adjustment program. I don't really think there is any disagreement between you and I, in fact you have used known examples to strengthen the point that Mrs. Gava and myself have put forth.

Spencer: It is really interesting to pursue the discussion of whether structural adjustment is really possible within a democratic framework.

It is clear that in Ghana structural adjustment would not have been possible without out Jerry Rawlings. The question that really arises is can you have a Jerry Rawlings in a democratic framework?

In Nigeria, for example, structural adjustment was actually implemented by the military after a democratic-style national debate. I stand to be corrected by Tony and other people but think that the population at that time made a conscious choice to go for structural adjustment, but I wonder whether it was not because it was sold as anti-World Bank. It was sold as a rejection of outside intervention. The military people cleverly used anti World Bank/IMF feeling to move forward.

The question is whether democratic governments would have been able to implement structural adjustment even using a national debate.

It's a real intriguing question. In Africa there are examples of democratic popular governments that have gone through structural adjustments and upheld them. Let's see what Zambia is trying to do. I don't think Tanzania is a good example. I think it is worth examining the question a little bit more in detail.

Ikpi: I think no matter the setting of governance that we use in implementing structural adjustment, there has to be an element of benevolent dictatorship. Even under a democratic rule, the head of government must be such that he is well informed to make decisions that he then imposes on the electorate.

I mean that's what happened, really, in the case of Nigeria. The military rulers had articulated within themselves what was going to be, and then they just drew in the rest of the populace, making them think that they were the ones that were deciding for themselves.

Matlon: I'm pleased that we joined the debate on the possible inconsistency between democratic reforms and structural adjustment. Now, the World Bank makes the case that democratic systems are necessary to succeed in the long-term in structural adjustment programs. I think the argument is based on two points. One is that the government has to be accountable. This is the whole issue of corruption and so forth. Government has to be accountable to the people.

The second is that the costs and the benefits of structural adjustment have to be perceived by the people to be equitably shared for long-term sustainability of the structural adjustment programs themselves. The belief is that this is only possible in a democratic system. Is it not more realistic to expect this under benign dictatorships, in which case how does one define benign dictatorship? What are its characteristics? How can it be assured. I'm just wondering if one essential element to achieve both accountability and sharing the benefits and cost is a free press, or a relatively open press, even if it's in the context of such a dictatorship.

Nobera: I think that it's very difficult to say because we don't have many examples of a long period with different regimes. My feeling is that accountability of government is an enabling factor for the private sector, small-scale farmers, and modern entrepreneurs to participate in the economy.

In Bujumbura, we have been in adjustment program since 1986. We had two years of adjustment program under a sort of dictator. The reforms were very difficult to go through. After the change of government, under a regime that was more democratic, I would say, the reforms were easier to implement. Now I think that Burundi is among those countries that are in the heavy adjustment phase.

The hardship has been enormous for civil servants, and for consumers, because food prices have increased very much. But what I have found, lastly, is in the opposition no one challenged or refused to carry on the reforms that are underway. I think that's a sign that if people realize that what

has been achieved is better than what would have been the case if reforms had not been implemented, then they accept the hardships. Now, the government will change, but reform will be carried on.

If the newer leaders stick to the same economic reforms, the same style of democratization, I'm sure that people would be encouraged to participate more in the economy. Civil servants would be more receptive to new ideas, and that is, I think, conducive to better performance of an economy. So, I think that democratization is an enabling, rather than a constraining factor for structural adjustment.

Deng: Thank you very much. Let us move to the export crop issues. The first question was whether export agriculture play a leading role in the agriculture growth. Two, does the promotion of export agriculture conflict with or complement other important agricultural sectors. Finally, the group was asked to identify five appropriate policy and institutional issues.

Ehui: I was struck by the suggestion of the first group that one should not necessarily rely on export crops to play a leading role. I was quite struck by that argument, and I think that maybe we can give opportunity for the chairman of the group or others to try to explain it further. I'm not sure what is meant by that. When we are talking of transformation of agriculture, it seems natural that it would have played the leading role in helping generate the necessary income to support the rest of the economy. The saying that export crops should not play a leading role seems somewhat contradictory.

Ikpi: We discussed that in theory, yes, export agriculture should play a leading role in developing agriculture. But that in practice, knowing what has happened in many countries of Africa, while not neglecting export agriculture, the food sub-sector of agriculture should be developed at the same rate and should be given the same emphasis.

In other words, we're not saying stop encouraging export agriculture, but do not overemphasize it and neglect the other part. For two reasons, we found out that practical experience advised against that. First of all, at the time that we had this emphasis on export agriculture in African countries, comparative advantage was clearly established. But at a certain point in time that advantage was lost, and for political reasons some countries continued investing more in export agriculture, to the detriment of the rest of agriculture.

Secondly, there was an increase in population, and, therefore, an increase in demand for food which could not be met sufficiently or meaningfully through food importation, because the money that was generated through export agriculture was not sufficient to import food to make up for what had not been produced at home. I always use my country, Nigeria, as an example. There, we once exported a lot, but the resulting foreign exchange that was supposed to be used in importing was either stolen, (which is very common in Africa, the politicians stole the money), or it was not actually applied to necessary imports.

Gitu: I think the important thing to remember is that we are saying that whether you push domestic food production, which has sub-classes for export, or try to emphasize exports, not just of crops, but of commodities in general, it is going to be guided by the principle of comparative advantage. We have noted the importance of earning foreign exchange, but we were wary of emphasizing an export-led strategy.

Hassan: I would like to give an example of what would happen if the government chooses, irrespective of the comparative advantage, perhaps for food security reasons to promote food crops. I'm giving the example of Sudan. The government decided to promote self-sufficiency, they expanded the wheat area at the expense of the cotton area, which was the major foreign exchange earner for Sudan.

That was not done on the basis of comparative advantage. Comparative advantage studies show that cotton is more economically efficient. It was fortunate for the government's expectations that last year the weather was very favorable and they had a very good wheat crop. But the temperatures that prevailed last year were happening for the first time in the last thirty years.

Now this year the temperatures went back to normal, and the yield went back to the average. Last year, they achieved close to 90% self-sufficiency in wheat; this year they are going to need to import 50% of the wheat. The problem is they don't have the money because they have reduced the area of their cotton significantly and have not generated the necessary foreign exchange earnings. I think that reinforces the group's recommendation.

Gava: I'm a little bit confused by the explanation given by Dr. Ackello. If you could just go by it again. The group says that you are aware of the need to go follow the comparative advantage. But in spite of that, you should not follow the export-led social strategy. Is that it?

Ackello-Ogotu: Now, we changed it. We're saying don't emphasize export at the expense of comparative advantage. In the case of Sudan, it was cotton. We don't want to neglect the cotton, but we don't want to make the mono-crop of cotton at the expense of wheat, for example, if wheat is required for domestic consumption.

Monke: I think the point that Chris and Tony are making is just to be careful not to do exports only for the sake of exporting, that just like self-sufficiency objectives can be ridiculous, so too can objectives to maximize the total volume of exports, thinking that somehow that's going to solve all your problems and create lots of foreign exchange.

The comparative advantage criteria, I think is something that allows you to emphasize exports where exports make sense, where they really increase your incomes, but also to emphasize domestic food production, or import substitution, where those things can be efficient.

Martin: I wanted to insert a word of caution. It seems that this discussion is oriented toward an either/or view toward exports versus domestic production, and I don't think that that's necessarily

the case. Increasingly we're seeing that food crops can be exports, and also that in many ways there are synergies between the kinds of investments one might want to make in an export-oriented agriculture that are beneficial to domestic production: areas such as communication, roads, etc.

Matlon: There are generally two arguments for export-led growth in Africa: one is that it's only in the world market that you can have very large and sustained growth potential, because the domestic markets are so limited for most agricultural commodities.

The second argument is for the generation of foreign exchange. Now, the alternative approach of achieving both of these is through import substitution in areas in which there is dynamic growth in a given commodity. A good example would be rice in West Africa. We've had extremely rapid growth, there's enormous potential over the long-term for import substitution in rice if you have comparative advantage in that commodity.

The other point I want to make is that very often import substitution activities have greater linkages, both forward and backward, than export commodities, which leads to additional macro economic benefits.

Goldman: Does West Africa have dynamic compared to advantage in rice? That's been controversial.

Matlon: And it remains controversial.

Goldman: I just want to be sure we have accurately reported your view.

Matlon: We are now in the process of determining where and under what conditions there is comparative advantage for rice in West Africa. I believe there's been too much literature which has tried to simplify by saying yes or no, and in fact it's far more complicated. It depends on region, technology, and complementary policy environment.

Abalu: I would like to follow up on promotion of export for export sake. In most of the structural adjustment strategies, most countries are locked into the emphasis on exports, mostly to obtain external balances, which is to try to pay off the debt.

It would be very difficult to see how you can attain sustainability in the other sectors while trying to reduce your external disequilibrium without doing something about the debt itself. I don't think much transformation can take place if one of the overriding objectives of most of this agriculturally-based economics is to try to generate enough reserves to service the debt.

We must tackle this issue of the debt. Whether or not we like it, it is very unlikely that most African countries can begin to make any kind of transformation with the kind of debt burden that they have. We need to understand the implications for net resource flows to and from Africa of debt relief or forgiveness.

I agree with Jerry that it's not an either/or kind of a proposition. For these kinds of strategies to be realistic, an important concentration would be to try to remove the barriers, intra-regional barriers between countries. In other words intra-regional trade in food products would become one way of exploiting the comparative advantage that different countries or different regions may have for different commodities.

Dapaah: What the group is saying is that export-led growth is not necessarily the answer, it depends on the country. I'll give an example of how it was done in Ghana. During the first three years of our reform programs agriculture wasn't featured at all. The emphasis was on gold, timber and cocoa. They were targeted. These are areas where it was felt that one could have very quick response to try to achieve this external balance that you were talking about.

Then as we emphasized those three areas, we set in motion the question of developing an agricultural strategy to deal with issues of agricultural growth, sustainability, and comparative advantage. So, it is not either/or, and in fact in Ghana now we think that the division between export crop and food crop is irrelevant. The important thing is to get the size of the pie increased, whilst noting that some people will be left out. Then the question is what do you do with those that are left out because you are using comparative advantage. But if you start by emphasizing these equity issues when the pie is so small no satisfactory solution can be found. It is easier to achieve equity with a bigger pie.

Mwangi: I wanted to comment a bit on the second part of George's comment. I agree entirely with what he says about debt.

But the second part, about international trade, I'm a bit worried that before we can meaningfully discuss the regional trade, we need to address basic internal market problems in many countries. The movement, say of grain from region A to region B, in a country like Kenya is still a nightmare. There are so many barriers.

A few years back a student of ours did a study on the grain marketing margins that you find between Kitale to Kitui. You'd be surprised that these traders calculate how much they pay at road block A, road block B, and so forth and then of course pass the costs to the consumers.

So, I think we've got to be a bit realistic. Let's have charity beginning at home. Let's remove internal barriers to the movement of trade within countries, because if you don't, how do you begin moving grain from Kenya to Zambia.

Domestically we are not doing a good job. We still have so many barriers. As soon as I get out of Addis Ababa, before I go two kilometers, there's a huge roadblock, and I meet two trucks. They've been there since morning. You know, for a businessman, that's pretty bad. He has been traveling the whole night from one region and he can't get to the capital city. He has to spend another whole day before they inspect everything.

Deng: Thank you very much. There is one point which I think nobody has raised a question about it, and I would ask the group maybe to give us more clarification. When you talk about harmonization of the tariff and trade system, are you talking about regional adjustment programs? Do you want one regional adjustment program? What is the mechanism through which you will harmonize the tariffs and trade?

Ikpi: When we were discussing tariff harmonization we felt that different countries in Africa have different incentives that would encourage agricultural expansion. These incentives often included tariffs that were, in most instances, inimical to the policies that were in place to encourage agricultural growth. So, we felt that either through individual country action, or regional integration, there should be a harmonization of this strategy.

In terms of encouraging what should happen from Africa to the rest of the world, and between countries in Africa, there will be a need to make sure that one country's tariff in a particular crop promotion does not clash with a neighboring country's tariff structure.

Staatz: I concur with the need to try to harmonize, but I have some misgivings about how complicated it may be across countries that not only have different tariffs, but also different exchange rates and currency regimes, so that you may harmonize your tariffs one day and you'll find them completely off-set by currency fluctuations the next day. I think it's a complex task.

Ehui: I do not support that idea very much, the idea of John Staatz. Look at Europe, where you have completely different types of currencies, completely different kinds of central banks, and there are even cases where you have some overvalued currencies. Yet trading in the European market is working very well. So, I think mechanisms for trading can be put in place despite differences in currencies.

Delgado: We have just been involved in a four-year study of this topic in West Africa, and in a nut-shell the results would say that you can't get very far with ECOWAS or CEAO if you discuss only tariff barriers. The national macro economic policies are fundamental to the incentives for trade within the zone, and they really have to be factored in. The European community is a considerably different case. It has the European Monetary Union, which, while it worked, was central to explaining its success.

Abalu: Just to echo what Chris has said, the utility of a common agricultural policy for African countries is quite important, but I don't know about the realism behind it.

Hassan: I just wanted to react to your question about whether we need to remove local barriers prior to addressing regional barriers. In terms of welfare analysis I think it is inefficient to have trade barriers locally. If there are trade opportunities you want to exploit locally, at lower transportation and transaction costs, I think it would be more efficient to do that before you exploit international trading opportunities.

VII. PRIORITIES FOR INVESTMENT IN AGRICULTURE³

Dapaah: This afternoon we are going to concentrate on priorities for investments. The emphasis will be on both public and private sector investment; the public good type of investment that will accelerate the rate at which we open up various economies for investment by the private sector.

Deng: Let me come to your assistance, Chairman. I think what we have been discussing for the last two and a half days is the subject of infrastructure, both physical and economic infrastructure. Let me start with the physical side. Not to regenerate my disagreement with Peter again, but it is in this area where we need to emphasize regional centers of excellence and research, because it's difficult for the development banks to support national research institutions.

A second crucial area for investment is roads which will create linkages between the supply and demand areas. We have been talking of some areas where you have surplus production. Yet, that surplus has not moved, due mainly to transport constraints. There are no incentives for private individuals to enter the market and move goods from surplus areas to deficit areas.

In addition to that I think the government can assist with storage facilities to enable marketing. Let me qualify that. In countries where there are no marketing depots, per se, the public sector should be encouraged to invest. But, in countries where there are already existing depots and storage facilities, I would recommend that the government move out of that and privatize it.

Now, that is the physical. Let me come back to the economic infrastructure. Here the emphasis should be on credit for micro enterprises. I'm not advocating subsidized credit, but creating access for those who are in need of credit. In most cases the question is not affordability per se, but more of access to credit. I expect there will be some disagreement there.

Dapaah: In presenting your views, if you could cite some empirical evidence, however unreliable, it will help to bring home the point that is being made. Otherwise it becomes so general it's like reading a textbook.

Endeley: I think one of the areas of investment should be to strengthen local infrastructures, especially those areas like health and water, which compete with investment in agriculture. Until we can strengthen those areas, the farmer won't be able to invest adequately in agricultural production.

Matlon: I want to underline that Lual and I don't disagree. The point that I'm making is that by creating new bodies, new institutions they will compete not only for scarce financial resources with national programs, but, as importantly, for scarce human resources. That competition would weaken national programs by drawing skilled people into the regional institutions.

³This section was discussed during lunch on Thursday, June 3, 1993.

Rather than doing that, let's strengthen existing institutions, in particular national research programs, which would take on additional research roles in a well-planned complementary allocation of tasks based on institutional comparative advantage.

Now, there's an important role to be played in this coordinating effort by regional institutions such as INSA, and such as SACCAR. For the humid and sub-humid zones of Africa, we lack such a coordinating body. There you may have to create a secretariat to promote this kind of integration of research effort.

Delgado: Mr. Chairman (Mr. Dapaah), I'd like to turn your question around. Most of us here are agricultural economists, and most of us are researchers. You have played in your country, and in fact in the region, an historic role in actually dealing with the problems of how to prioritize agricultural investments in a period of shrinking resources.

I'd like to ask you a three-pronged question in that context that I think would be helpful to all of us. First, how do you do it? Second, what is the true latitude for actually changing priorities around in the real world? And third, what can ag-economists of the type you have around this table actually do to inform those decisions better? I mean what would you like to see us do?

Ehui: Over the past two days and a half we have identified research as an important area for investment. Now, to the best of my knowledge little evidence exists in the literature about the real return on investment in research in Africa. We stated that if we invest in research, it will be a profitable investment from a public viewpoint, but there's no real information that one can use to convince the policy makers of this. Therefore, we should try to do so some studies on return on investment in agricultural research in Africa.

Gava: I'm concerned about how we privatize storage and marketing activities. The marketing boards, we know in countries where we've had these boards, they've really been very big organizations with lots of depots, big buildings, and whatever. And at the same time the number of people employed in those marketing boards tended to be very big. I think we could all benefit from hearing from our Chairman about Ghana's experience in dealing with this. So, I would really appreciate your giving some idea how you can find private people who have capital to take on these huge operations. How have you handled this dissolving the marketing boards into the private sector.

Dapaah: Thank you. It looks like Mr. Chairman is still on the floor, or rather on the carpet. Can I try and go back to the questions that Christopher asked, and ask those who are going to contribute to assume that we know there is a need for investment and we know the type of investment that is required.

The question is "How do you do it?"

Rukuni: I have three points. The one is a matter of principal, and I say a matter of principal because I differ greatly with the structural adjustment program on that issue. As an economist, I've been brought up to understand that there's a very big distinction between the financial return to an investment and an economic return to an investment.

Now, a financial return pertains only to private profitability. In contrast, an economic return should actually ensure that in the process of getting back more than what was plowed in by the public, the nation as a whole benefits one way or the other.

Now, the problem that I see with the pattern of public investments as effected by the structural adjustment program is what most people are looking at doesn't earn a financial return to the public investment, which to me is ridiculous. In other words, if you are not going to get two cents after plowing back one cent, don't invest. But they're not going back to do an economic analysis to see, where you are looking at public investment, if the nation-at-large or the economy-at-large is going to benefit.

I gave an example, Chairman, a couple of days ago with the putting of grain marketing board depots in this country; and what we are being told now is you should just look at the financial return before you put that depot in there, but there's no way the Minister of Agriculture in Zimbabwe has even figured out how to go in an area and assess to see if it's got potential for production, which may be restricted because there's no marketed output, in which case you would put a depot there which may not pay itself back tomorrow or the year after but in the long run will benefit the nation. This is the biggest problem that African nations are facing, as we are trying to get them to invest more during structural adjustment.

And I must also differ a little bit with Lual and say for the reasons I've just explained that what may be perceived sometimes as a subsidized credit may not really be a subsidy. It may just be a special time preference which is consistent with long-term investment, depending on what that credit is being used for. If you are giving someone credit to buy a meal today, then I would agree with you: don't subsidize it. But if you are giving credit to dig a well which will support someone over the next 25 or 30 years, then there is absolutely nothing wrong with a lower rate of interest, which is something more than the market rate of interest.

Sequencing is another very important issue. For example, we have a series of institutions which are trying to support farmers or the agricultural sector. One way or another there's some kind of political process in terms allocating resources to research, extension, credit, and marketing. But in actual fact, if you look particularly at research and extension, I believe that there needs to be more sequencing there. Maybe we are rushing too much to extend technology that does not exist.

For instance, using Zimbabwe once again as an example, for a long time research and extension were in one department. That is, until there was enough technology to extend. Now we really need a more comprehensive extension service. But if you're going to have to go there and try and persuade farmers to take a technology, maybe you should spend more time getting that

technology right. Then it has to be sequenced with private sector investments. If it's seed, for instance, you can have the best seed around, but if there's not going to be a seed company to multiply that seed then we still have the problem. The same variety of seed could go far in Zambia and not go very far in Mozambique, in the same agricultural environment, simply because there hasn't been that private sector investment to pick up from the public sector investment.

Staatz: This is just a piece of information in response to Simeon Ehui's plea for studies on returns on research. About two years ago, U.S.A.I.D., actually George Gardner's office, commissioned a series of such studies that have been carried out by researchers at Michigan State in association with researchers in a number of African institutions, and these have been case studies of the return to investment in research and extension. You really have to look at research and extension as complements. It's often hard to sort out separate rates of return to them individually.

In general, the results show high rates of return, but conditioned very much on the policy environment, and on the institutional setting. There's a high degree of complementarity amongst those. Now there are a couple of caveats: as you look at those studies, they are studies that tend to be commodity-specific, not systems-specific. So we're looking at investments for example at maize research in Mali, not investment in the whole system. And then you come into the questions of do you have enough examples to apply the law of large numbers and can we generalize from commodities to whole systems?

The second caveat is whether one can use historical data to predict the future, or are we in a fundamentally different world in the way research is organized today than yesterday?

For example, even though the study in Mali may show high rates of return, I think that given the very dynamic changes in the national agricultural research system, I wouldn't use historical data to predict what's going to happen in the future. I think your rates are going to be much higher, just because of the changes.

Gitu: I would like to talk a little bit about public investment in my country. I am being taped, so whatever I say may be held against me.

I'm going to be bold again and say if I was asked the same question by Christopher for Kenya, I would say government should invest less. Why would I say that? If I look at the public investment in Kenya, especially in agriculture, we have about five major investments: the National Cereal and Produce Board is a giant investment; the KCC marginally for milk; then we have the Kenya Meat Commission, and we have the bacon factories. Another major government investment is in irrigation schemes. We have a giant World Bank irrigation project, but the return from that investment is negative.

So, what I would like to say for some of the countries who have the same experience as my country is the government should do less. I think the government should continue investing in research because I think it has quite high return. I think Kenya was doing very well in the Sixties and

Seventies in maize, though I think we have relaxed quite a bit since then in investing in maize and general cereal research. But when you talk about investment for the Kenya case, we are using a lot of money to invest in agriculture, which is actually killing the private participation in agricultural development. Why? First, we do not provide the enabling environment, especially for grains. The National Cereal Board has controlled grains since the Sixties and before, and therefore there is no need for the private sector to invest in storage. The price in January is five shillings. It will be five shillings in December. Why should a person invest in storage? If government moves out of the grains, I think you will see more private sector investment.

The same with milk. If we are talking about successes due to structural adjustment, since we decontrolled beef and milk prices last year, we have seen small dairies actually coming up-- small to medium dairies coming up. That is actually one way of divesting in milk processing.

The same thing with plants, or the bacon factories. Today we are seeing more farmer participation in the processing of pig products because the government has more or less divested.

Therefore, what I would say is that though we are talking about areas for investment, I think it is very clear from the discussion here that investment in research actually is a hard pill. What we should be focussing on, maybe, is government divesting. I was asked by my friend, Gava there, that if we divest who will take it up? In the short term, maybe nobody, but I'm sure in the longer term somebody will actually invest in it. It's a hard pill to swallow, because we must get government out of doing business that it cannot do or that it does unprofitably. That's it.

Dapaah: Well, just a short reaction. Dr. Gitu, no need to fear. As you've always encouraged others to be bold you have to be bold. I hope you are not proposing that we annihilate government totally out of the grain system.

Gitu: Mr. Chairman, give me one second. What I said, and I hope I made myself clear, is that yes, the government is important in development. Yes, government can invest in some aspects of agricultural to transform agriculture. But I am saying there are areas where government has invested and where it could have done better with the same amount of money invested elsewhere. That's all I'm saying.

Spencer: Mr. Chairman, you said that we know that public investment is necessary. That is true. You also said we know what type of investment is necessary. I don't think that is necessarily correct. Then you ask us to work on how to make the investment happen. But, I'm not sure we know what to investment in. For me, it is useful to use a matrix that divides the types of investments that we can have, and the participants - the participants being public, or joint public-private (since this is public investment, we are not talking about private investment). So, when we say "no" in any cell it means there should be no government investment.

We can also look at the different types of investments as agricultural production, non-agricultural production (which includes processing and manufacturing), associated infrastructure (such as irrigation systems and roads, particularly farm-to-market roads), input markets, output markets, and the research institutions.

You have to then look at the specific or particular countries. When I look at my own area, West Africa, I say that there is no case for government investment in agricultural production.

Then I come to non-agricultural production, which means processing and so on, and I say the same thing: there is no case for government investment.

When I move on to infrastructure, I say that there is a strong case and it is appropriate for government to invest in irrigation systems and farm-to-market roads. I would say that it has to be almost a complete government responsibility with regards to input markets, I would say there is no need for government investment. The same for output markets.

Then I come to research institutions. Even though there are some countries where there has been some private investment in research, right now I would say for most places, there is no chance of much private investment in research. So, all of the investment in agricultural research has to be public investment.

Mwangi: I think it's a reality that the government is so much in the agricultural sector that, if you're going to enhance or encourage private sector investment, we should be talking about how we get the government out of the agricultural sector. They are heavily invested in all parastatals, whether you define them the way Dunstan was trying to -- whether it's in production, in processing, or in infrastructure, they are there.

Various governments in the sub-Saharan Africa region have reacted to the pressure of how to get out of agriculture in different ways.

I had the honor of being a member of the Presidential Commission on Divestiture of Government Investments in Kenya. We spent four years trying to advise the government on how to get out of parastatals in general -- the whole economy, not just the agricultural sector.

Some of the questions that the government asked us are very important, because we had to recommend which parastatals to divest first, and if we divest, who among the citizens should be allowed to invest in those particular industries? Are we going to allow non-citizens to invest in this? Who is going to value the shares?

The thing becomes so political that before you sort out the politics one realizes that most governments are actually not committed to moving out of agriculture. What they are trying to do is buy time by forming all sorts of commissions, hoping that they recover, so they can tell the donors, "we don't need your money."

Dapaah: I see some inconsistencies here because we started by saying that government should invest. Now I'm hearing that government has done too much, it has to get out. I think there's no simple answer.

Ehui: I would like to make a few remarks on Mrs. Gava's and I think on Dr. Mwangi's point, as well as yours. I think it's very clear that we agree that the government cannot be everywhere. At the same time, government cannot disengage totally. There are certain sectors in which they have to invest, such as in infrastructure and institution building. But on the issue of how government can disengage, or the question of which citizen can take up some of those big parastatals, I think the answer is clear, and in the case of my country, Cote d'Ivoire, the government owns large companies which are parastatals, and the simple way they did it was to sell shares to people. And people bought them. Private people are now managing and owning them. Generally people are ready, they have the capital to invest as long as the government is ready to yield.

Mwangi: That's a very critical point. Who are the people with the resources in Cote D'Ivoire? That's why I'm saying let's be very specific about the countries, because let me tell you, in a country like Kenya all that wealth might be with a group called non-citizen.

Nobera: I'll be very brief. I think there is no need to prove that investment in infrastructure, physical infrastructure, has not been enough in our country. One problem is that maintaining the new roads is so expensive. I don't know if it's not advisable to see if there are other ways to allocate scarce financial resources. I think of one kind of capital investment is in the human capital-building. It may be too late to raise that question, but I have read in the past some reports on the impact of primary education for functional literacy on farmers' performance.

Are there people here who can tell us about the state of the art of this kind of investment to see whether instead of investing in physical infrastructure, it might be more profitable to invest our money in the farmers themselves?

Monke: I would just like to make a few comments about some ongoing research that we're involved with in Kenya which is concerned specifically with marketing reforms and public investment and infrastructure, and what that can do to the agricultural economy. In so doing I will reiterate some points I think that were made by Dunstan.

First of all, where does this investment come from? I think when we look at things from afar it seems such an impossible or difficult task that we can't imagine how people would accumulate necessary investments. An example would be the cereal sector, what's going to happen, who is going to take over the sales activities from the National Cereals Produce Board?

But as it turns out, when you do very careful empirical work, you suddenly find ways that people come up with investments.

One of the things that we found about the storage activity was that liberalization of the market would result in processors taking over a lot of the storage activity. What was interesting was that

processors would be able to finance the necessary investment in storage facilities by the extra profits that they would realize from the initial liberalization and the price differences that would prevail between regions. Over time, those differentials would disappear; but in the process processors would accumulate enough capital to finance quite substantial storage activities.

My second example has to do with public infrastructure and looking at road investments and road improvements, particularly what those can do when farm-to-market roads are improved. Two of the areas where we found enormous increases in potential returns occur in dairy, because it becomes much easier to access markets on a continuing basis throughout the year, through the rainy seasons and so on, and in tea, where it again becomes again more timely with higher quality outputs.

Farmers are able to make these investments. How do they do it? They certainly don't do it through the formal credit system or through the banking system, but they have 101 ways to come up with the necessary investment. Often that involves friends, relatives, taking jobs outside of agriculture, accumulating cash in that way. They can accumulate cash in small amounts and make investments incrementally to build up their production operation over time; rather than having to do a hectare of tea at one time, you do small plots.

Dapaah: Thank you very much, and thank you for your cooperation. And I'll just take ten seconds, twenty seconds to say how we did it in Ghana.

A three-man government task force which I had the honor of coordinating looked at all aspects of agriculture, all the sort of things that we have been talking about. We collaborated with a World Bank team. At the end of two years the document we produced could be claimed by Ghana as its own document because it was done by its own people, Ghanians who were born and bred in the country. And the Bank could also claim having had a role in its preparations.

VIII. REQUIREMENTS FOR INVESTMENT IN HUMAN CAPITAL

Spencer: For the past couple of days we have discussed a lot about agricultural technology requirements and policy requirements at the national and sectoral level.

We have talked about policy implementation that is related to governance, etc. To do all of these things, we need the people and the institutions for implementation. That's what we are going to be talking about now. We need research, of course to generate appropriate technology, as well as to identify appropriate policies, and to monitor and evaluate the impacts.

We then need the policy makers who are supposed to implement or facilitate the implementation of these policies and strategies.

And most importantly, we need the producers of agriculture commodities, as well as non agricultural commodities, small scale manufacturing enterprises etc., who are going to bring about the production increases and the transformation that we need to achieve a 3% or more growth rate.

I don't think it is possible in the time we have to discuss quantitative requirements. So, I'm going to suggest that we discuss in relative terms and we concentrate on identifying where the bottlenecks are. Let's identify the actions we need to take.

I would like to structure the discussions so that we start first by talking about research for ten or fifteen minutes, then we move on to talk about policy, and then production activities.

Deng: Mr. Chairman, the number two issue, production, I am not too clear. You are talking about human capital here. What do you mean?

Spencer: We are talking about human capital and institutional development. Are we doing it to train producers, for example? That's just an example.

Martin: I'd recommend that you also put in something about business. Just business, not necessarily agribusiness?

Abalu: I just want to set the environment, if you like. It would appear to me that there's a recent recognition that too many outsiders have been involved in trying to look for solutions to African problems, and that is part of the problem. These are some of the things a number of us have been saying for a long time, and I would like to relate this to the issue of the policy makers in terms of what the bottlenecks are and what remedial actions are required.

First of all, in agriculture, the actual understanding and planning capacity and policy analysis capacity just does not exist in many of these countries, including some bigger countries like even Nigeria.

So I think quite a bit of on-the-job or practical training is absolutely essential. I'm not sure what this capacity building initiative of the Bank is meant to address. Apparently it's addressing everything. But my point is that policy analysis and policy making capabilities in Ministries of Agriculture do not exist. It's not so much the formal training, but the actual ability to formulate policies in the practical sense.

I think perhaps that for structural adjustment programs this deficiency has been most profound. There are very few Ministries where even the director of planning can actually understand in great detail what are the basic instruments that have to be manipulated.

Deng: For the record I wanted to point out that the African Capacity Development Foundation is not the World Bank, it's a joint force between the African Development Bank and the World Bank and the UNDP.

Rukuni: I think what needs to be done is in two parts. Institutions, if they want to be strengthened, that does go hand in hand with human capital investment. The quality of human resources in our research institutions is very low. Compared to even Latin America and Asia, it's very low.

Now, the thing to do is what Southern Africa is trying to do, and that is to link research with training: so governments have to equally invest in faculties of agriculture in as much as they invest in departments of research. Until such a time that African universities or faculties of agriculture train 90% of their own Ph.D.s in the country, we're not going to have innovative researchers like you find being produced let's say in the American university system. You just can't do it by sending them overseas and hope that they'll return and be innovative in their own environment.

And just to make a comment on the African Capacity Development Foundation, that thing has very little to do with agriculture. They are just not interested in agriculture.

Spencer: Thank you, Mandi. I think that you are talking about increasing the number of people in the research institutions as well as improving the quality. I got the impression from George that he was talking basically about improving the quality of existing staff, not necessarily of increasing the numbers. That might be something in general we want to consider: do we have enough researchers? Is it a question of quality or quantity.

Ehui: I would like to make a comment on the role of donors and the national government on the human capital and institutional and capacity building. Donors often invest in agricultural projects, which have yielded very low return compared to what similar projects have yielded in other parts of the world.

I would like to suggest that these data indicate that the donors should use their money otherwise, and I think a good way to use it really would be to invest in health and human capacity building. I think that they can really help a lot of African countries by investing significantly in this

area, in human capacity building, more than even on the institutional or physical infrastructure, which can be left to the national government. It is only by that means that a lot of African countries can increase their capacity to do research and training.

Spencer: In the first day I think Ted Morse⁴ from A.I.D./Zimbabwe mentioned there was a lot of investment in human capacity creation in the Seventies, and that despite having reached the level of take-off, things seem to have collapsed. Maybe we have to see what went wrong and what needs to be done.

Also, there have been issues mentioned about "centers of excellence." What is the implication? I mean are we going to develop human capacity for all institutions, all national institutions, or do we develop centers of excellence?

Matlon: The funds, the financial and human resources, don't exist to create national universities in all of the countries of Africa which are capable of producing truly world-class Ph.D.s in the agricultural and social sciences. I think an approach to be looked at, which was flirted with in the Sixties and I think we should return to, is the creation, not just of regional centers of excellence, but world centers of excellence within Africa that would serve groups of countries. These countries could use various mechanisms, such as twinning. I'm thinking of twinning not just as it's been done in the past between African and North American universities, but among African universities themselves. Exchanges of faculties, joint use of library facilities and so forth, and twinning with European universities. There's a strong Anglophone bias in this group, and I would say coming from West Africa it should be bi-lingual, so we could bring in the best of the French tradition and the Anglophone tradition.

The second point is that the research that should be done by Ph.D. students has to be done within Africa. I'm thinking of students who are being trained abroad. Through the wisdom and generosity of the African Development Bank, for example, WARDA has received grants which are permitting us to train some 35 Ph.D. students over the next five years, providing them the fellowships to do field work. It's an extremely high pay-off investment, it seems to me.

The third point that I would make is that in the agricultural sector, the problems are not of a single disciplinary nature, they cut across disciplines, and the curricula that are developed for African agricultural scientists at the Ph.D. and even at the masters level have to be multi-disciplinary. It would be extremely useful if all agricultural economists *had* to have a minor in agronomy or in breeding, and vice versa.

Deng: There are three things I would like the research to focus on: food production technologies, environment and accessibility, and the third one is biotechnology. We need, I think African capacity in those areas to do research.

⁴See Appendix A.

In order to build that capacity, and to maintain the African human capital, there is a need to secure funding for those regional research centers of excellence which I mentioned before. I think it goes beyond just giving a mandate to the nationals. Now, you have also mentioned the problem of donor fatigue. This is the only area where there's no donor fatigue. Someone asked earlier about personal quality versus quantity in research staff, I will say we need both. We need more researchers, but also we need high-class researchers who will stand behind what they have written and what they are talking about.

We also need better dissemination of research work and networking.

For research you need a lot of investment, you need some patience, but you also need a lot of public relations, and that public relations will come through dissemination of your work.

Mwangi: All I wanted to say is I have no quarrel with the centers of excellence, but before we move on and invest new resources in these, why don't we stand back and look at history? This is not a new idea, Mr. Chairman. We in East Africa have struggled with it. Makerere is the oldest university in Eastern Africa, and in parts of Southern Africa as well. The countries decided that the people in Eastern Africa in medicine and agriculture would be trained in Makerere. We had those centers of excellence in agriculture and medicine. Nairobi would be a center of excellence for engineering. University of Dar-es-Salaam for law. Now Makerere has literally collapsed, others are collapsing day by day, so what went wrong? What can we learn from it? What caused that kind of disintegration and drastic move from what I thought was a very noble idea. I wish someone would want to tell us about the experience now in the SADC, because SADC is trying to create centers of excellence like the University of Zimbabwe.

We are very fond of reinventing the wheel, and meanwhile we spend a lot of very scarce resources.

Spencer: Thank you very much, Wilfred, for reminding us of the history. I think there is nobody who would be foolhardy to proceed with any of these ideas without examining particularly what happened in the past.

Of course there have been changes. The feeling of independence in the late Sixties and Seventies, which dictated that each country should have its own national airline, and university is different from what we have now. So, it doesn't necessarily follow that the same thing will result.

Secondly, every country now has a university, so I would think that a center of excellence would be put on top what exists. It would not mean that you have to have engineering only in one university. Now every country has engineering, what you need is to convert one of the engineering faculties into a centre of excellence.

Now, please let us move on to policy issues. Talk about research and training if you like, but in a few minutes I'm going to be moving to talk about production as well. Gitu.

Gitu: Thank you, Your Excellency (laughter and applause).

I would like to talk a little bit about donors and capacity building in Kenya, and East Africa especially. Donors have failed us. If I remember in '75 we had many problems of capacity building. We had HIID there to help us, and others too were trying to build capacity, especially in the Ministry of Agriculture. There we trained a lot of people, over 70.

Then we had another program in the Ministry of Planning, trained through New York University, who trained over 70.

Now, it seems to me that we're not training them for any particular demand. When they came back, you find they never stayed in the ministry. They move to the private sector, because nobody can retain them, nobody can afford to pay them. It's OK, I'm going to talk about the micro benefit, because they are still in Kenya. And that's what donors usually say: Oh, you haven't lost anything because they are there, right?

But what we are talking about is policy, capacity building for policy analysis within Ministries, not in East African Industries in other firms. We are talking about capacity building within government. What did we do? We had a project for capacity building and we had ten advisors and many Kenyans. So, on a \$10 million project, you find out \$8 million went back home. How did it go back home? It went back home because they hired a Gitu from New York, a Gitu from Europe, a Gitu from somewhere else. All the Kenyans were there but they still are not taught how to do policy analysis.

What are we doing now? I'm hearing there is an African advisor in Addis somewhere. I am very happy, and this is what I would like to recommend in this regard. Any country that wants to build capacity in government must use her own people. You have to forget foreign experts. I don't think they know enough.

Number two, we have to pay our nationals. There is a tendency to send our own nationals to these centers of excellence after they come back. I have found many guys trained at Harvard University, but when they come back, they are treated as if they never went to a center of excellence, because they are paid civil service remuneration, which is very little.

So, what I'm saying is for Africa to be able to build capacity within government we must be able to recruit our own people, be able to pay them and be able to improve their conditions of work, because it is irrelevant to ask somebody from a particular university who's teaching in the U.S., and paid \$50,000 a year in the U.S., to come to Africa for nothing.

So what I'm saying is if you are going to strengthen capacity we must also try to afford it. We have to pay for it.

Number Three, the creating of new centers. To me it is wrong. For the case of East Africa, we have old institutes, we should depend on those institutes. In areas where we don't have one, you can start one. I think the whole idea of creating new centers is wrong.

Spencer: Thank you very much. I think you have really hit some critical points. Let me just highlight the two critical points and the questions that we are raising.

The first question is, can you train people and target them for specific jobs in specific institutes while in a situation where there's a general undersupply in the economy? In India and Asia they did a massive amount of training. Before they could keep the people in the planning ministries, they had to first supply the private industries, the international community and so on. Is it possible to train 70 people for the Planning Ministry in Kenya and expect them to stay there while the business enterprise needs them?

The second issue is, are African governments willing to pay internationally competitive prices for these excellent Africans that want to work in the national program? That means you're going to create a super elite compared to the rest of the economy. Is it feasible?

Nobera: I would like to thank Dr. Gitu, because he expressed much better than I would have done most of the ideas I had. I think, to respond to your question, Mr. Chairman, I think we should not train 7 or 8 people to keep one or two. I think there are better ways to do that. If the policy analysis has to stay in the public sector, where the salary is very low, then since there are so many studies that are done by donors they should work closely with local experts and pay them expatriate salaries.

Spencer: The problem has not been with the donors not wanting to pay the nationals internationally competitive salaries. The restriction usually comes from the governments. It is the governments that have said "we're not going to pay this guy this amount of money, or we're not going to pay this sort of consultant fee to our people."

So the ball is not in the court of the donors, it's in the court of the National government. We are the ones that have to reconcile that difference.

Gava: Actually I wanted to supplement what Mr. Gitu said. In addition to what he put forward, we also need to make our government officials have some confidence in their own people. We might say that the nationals don't have the capacity. But how else would they have the skills if they are not given the chance? We have examples. I'm not trying to blame the people who have been there, but our structural adjustment program has been run by at least two people I know who have been around for about twelve years. You say in the country we don't have the people who can do this analysis, so you bring in some people to help you, but you have gone to them for as long as they can be alive. It's always covered up with technical assistance, which is transfer of technologies. These people are supposed to be training but that one never happens. This is not because these experts don't want to pass over the technology, but because the national coordinator or the

Permanent Secretary does not really believe that their own people can do anything. I think we really have to improve how we utilize the human resources we have.

Martin: I wanted to address this issue about institutions and human resource development in the area of business and the work that I think needs to be done in training people to carry out what is one of the most important aspects of transformation in agriculture, and that is the commercialization of agriculture. I find it kind of surprising--or maybe it's not surprising, maybe there are too many economists here, too many people from academia--because none of you have been talking about it, and I think it's a real mistake.

I mentioned this the first day and I'll mention it again because I think the next time we meet it would be imperative to have some African business people here who could put a dose of reality into this.

In any event, I think there are a couple of places where investments could be made in business schools. I know for example there are a couple of African business schools now which aim to create a cadre of people who are knowledgeable about international agribusiness practices. In addition in Kenya now there's a new agribusiness association that's just been founded within the last six months. I think it's institutions like that that need to be encouraged. I mentioned in one of our smaller meetings trade associations, institutions to bring business people together with government, so that they can discuss common problems and solutions to those problems. This is extremely important.

I also mentioned one other type of institution which, at least in my experience is probably the least effective in Africa, and those are the Chambers of Commerce. Those Chambers of Commerce for the most part have been dominated by government-appointed individuals, and they really are shells in terms of representatives of the private sector and business people.

So, either we need to reinvigorate and rejuvenate the Chambers of Commerce, or think of new institutions that fill the kind of responsibilities that those Chambers were supposed to fill.

Endeley: Jerry Martin touched on what I wanted to say. I think that we really need to reinforce local training centers. In some places it might be to reinforce the extension education services at the local level.

Also, we do have community development training centers that are involved in training, not only in agriculture but in non-agricultural activities in the rural areas. Such institutions, involved in multiple activities affecting the welfare of the rural populace should be given both financial and technical assistance. For example, if health is a major problem in a community, every possible assistance should be given to health institutions at local level because of the multiplier effect that poor health has on agricultural productivity.

Spencer: Thank you very much, ladies and gentlemen, we have come to the end of this session, and we have run out of time, but let me just repeat one or two things that I at least noted as important here.

One issue that was stressed was the need to strengthen in-service training for policy makers in existing ministries.

There was also a suggestion that we should increase the capacity and train better quality people. The issue of using centers of excellence was also raised. We should examine critically the experience that we had in the past in this regard. The point was also made that with Ph.D. student training overseas, we must insist that they do their research in Africa.

We discussed extensively how to retain trained staff in terms of the role that government has to play, both in having confidence in its own staff, and devising remuneration schemes that will enable retention of trained manpower in a situation where there is a big demand for them, not only nationally, outside government, but also internationally.

We also discussed the need to strengthen agribusiness training institutions and Chambers of Commerce, to improve data collection and dissemination, and to reinforce local farmer training activities in areas outside of agriculture.

IX. CLARIFYING THE MAIN THEMES

During the last session, participants identified the following points and conclusions as being the main ideas developed during the three-day Symposium on Agricultural Transformation in Africa:

- 1) Agricultural transformation is a long term process in Africa. It has been taking place at a very slow pace. Given current policy directions and levels of investment in the sector, it will take at least a decade to achieve a desirable level of transformation in many African countries.
- 2) Available agricultural technology (on the shelf) is more limited than was assumed at the Winrock round table discussions on agricultural transformation, but this will vary by commodity and by agri-ecological zone.
- 3) It is very difficult to generalize about agriculture. There is need for more analysis and integration of data bases by agri-ecological zone.
- 4) The *stock* of new technologies is limited, but combined with the pipeline flow of technologies under development, there is potential to support a reasonable growth rate in the short run following farm adoption. But the agricultural intensification which results will not be sustainable without strategic improvements in resource management technologies.
- 5) To ensure that the pipeline of new technologies yields its expected output at the farm level, there is strategic need for more interaction between the international centers and the national agricultural research systems (NARS).
- 6) Agricultural research management reforms should emphasize
 - i) identification of research priorities with better integration between technology development and demand;
 - ii) coordination/integration of different elements of research units within and between countries;
 - iii) monitoring/evaluation of research progress and more timely and effective reporting of research results;
 - iv) real increases in funding.
- 7) Agricultural technologies need to be evaluated with a long term perspective and on a wider basis than yield per hectare, including household food security and labor constraints.

- 8) Without viable improved technologies, much of the investment in extension is not effective. T and V has been successful in some countries, but a cheaper and more flexible model is required in many places.
- 9) To gain efficiencies and rationalize national boundaries with cross-cutting agri-ecological zones, the integration of agricultural research should be promoted based on national research system specialization and the pooling of research focused on common agri-ecological zones and commodities.
- 10) There is a current stock of under-utilized technologies for highland and some parts of the sub-humid regions of Africa. In these areas fertilizer marketing and pricing are strategic constraints. On smaller farms access to credit remains a problem, despite the large donor funded agricultural credit programs.
- 11) Comparative advantage is a useful concept for identifying directions in agricultural development but
 - i) such advantages can be much affected by structural changes: sectoral policies, infrastructure investment, resource endowments, world prices, and technologies;
 - ii) emphasis on similar commodities by African countries may cause significant reductions in world market prices and alter comparative advantage over time;
 - iii) comparative advantage may include production of commodities that are produced only for domestic markets rather than the world market.
- 12) Trade barriers between African countries should be reduced but internal (domestic) barriers must come down first.
- 13) Parastatal marketing structures should be de-emphasized and *competitive* market structures promoted.
- 14) Institutional changes in contract legislation and enforcement, regulation, and access to capital are required to support agribusiness expansion.
- 15) There has been a general improvement in agricultural performance in most countries under structural adjustment, but this improvement is probably not sustainable without substantial improvement in marketing infrastructure, promotion of competitive market structures, and capacity for resource management of intensive agricultural systems.

- 16) The border price reforms component of adjustment programs have been effective but the actual impact on agricultural growth is highly varied in Africa. Actual farm prices are also affected by public expenditure impact on marketing costs, the degree of internal market reforms, and the market structural consequences of privatizing parastatal agribusiness units.
- 17) The dynamics and role of food prices *relative* to other agricultural and non-agricultural prices varies among African countries. Further understanding of this is critical to improved design and management of policies aimed at agricultural transformation.
- 18) The discipline, sacrifice, and economic re-organization required for successful structural adjustment may not be consistent with rapid democratic reform. But accountability and *equity*, two requirements of successful structural adjustment, are difficult to promote under non-democratic regimes.
- 19) This symposium should be followed by another in 18 months where country specific research papers on the effect of structural adjustment on agriculture are prepared based on common methodology and recognition of agri-ecological, political, and institutional variation. The meeting should have a broader representation of participants including those from private agribusiness sector and women.

The points presented here are the outcome of ideas submitted in writing by participants on the morning of day three, representing the key ideas discussed at the Symposium through mid-day of the final day.. These were discussed in the final session and either accepted as suggested, modified, synthesized with others, or dropped. These points, therefore, do not include key ideas discussed during the afternoon sessions about investment priorities and about human capital and institutional needs. Interested readers should refer to the edited summary of those discussions, above.

APPENDIX A: OPENING REMARKS BY TED E. MORSE

Thank you very much, Richard, and welcome to all of you, to colleagues of Brian and Jim Beebe. Being Ambassador for today is like being queen for a day, you don't really get to make many decisions.

I would also tell you that I'm going to exceed my mandate from Mr. Goldman slightly. In addition to issuing you a welcome, I'd like to issue you a challenge. And the challenge is basically that in this meeting you be professionally frank and honest and open; that you be professionally analytical and critical and accurate, and that you present original and creative ideas.

I would ask each of us to challenge ourselves in this meeting, to get away from the buzzwords. When I looked at the schedule and looked at some of the topics, I know that they mask some very, very important problems in agriculture in Africa.

I would ask my African colleagues, for those of you that came out of small farmer, rural backgrounds, how many of your parents, how many of your aunts, are still living in poor conditions in the rural areas, not a lot different than they were fifty years ago. And why is this?

We sit here in the splendor of the Sheraton in Harare, with all of its glitz and glitter, and yet you know that we can be three minutes out of town and people are still in the same subsistence agriculture, in the same mud huts, on the same small plots, with the same traditional kinds of productivity in a nation that normally has an agriculture surplus. Why is it we haven't had a green revolution? What is constraining this? Not only in Southern Africa, but in the rest of Africa as well.

That's why I ask that we get away from the buzzwords, we get away from "food security." I won't ask for a show of hands because it would embarrass me as well as you: how many meetings have we in this room attended in the last five years where on the agenda is the first item of agricultural development in Africa? Food security in Africa.

The United States has invested billions of dollars over the last forty years in agriculture, and we're only one donor. Some of our billions have come through World Bank agriculture sector loans, some through the African Development Bank and sector loans, and much of it through bilateral assistance. Many things have been changed. I closed down United States aid in Nigeria in 1976 and 1977, not because they had "graduated" but because they were now getting \$6 billion U.S. a year from us in oil sales, and they didn't need the small amount of concessional aid. Some very important things were done back then.

But that was 1976 that we closed that down. Where is the green revolution, so that we don't sit here and still wonder about food security at the household malnutrition and stunting level; food security at the national level, where we're still worried about whether or not there are important countries that are not food secure, and the regional security stocks. Why is it that we are sitting here today still talking about the same things, when there has been progress, but we still haven't made

enough progress? That we don't have that green revolution so that the grandparents and the parents and the aunts -- you notice I don't say the uncles -- out on the small farms that are still farming the way they did fifty years ago.

I hope that that's the kind of challenge: to have some hard, hard questions answered in this transformation of agriculture in Africa.

One other challenge: on the technical changes in the research side. I think that African agriculture is better than most people recognize. Here in Zimbabwe, the sorghum and millet research that has been done at ICRISAT, and through ICRISAT into many of the Southern Africa countries, a lot of good research has been done here in IITA and ILCA, but it isn't getting into the bellies of the people who are still food-insecure.

Now why is that? Where are those technical and research results that are getting new food into the bellies of people? I have the feeling that this kind of research is there. Some lessons have been learned, and I would challenge you to, in this meeting, as you look at the transformation of agriculture in Africa, to go beyond what the constraints that we've all lived with for ten, twenty, thirty, forty years. We've got some answers, how do we apply them? How do we install them?

What are the lessons learned? Where is the food safety net? How do you target so the politicians aren't paying off people with food to get elected in '95, '96, not in this country, but in every country, but are actually putting in safety nets so that as the structural adjustments, the policy reforms are put in place, you don't have severe dislocation at the human or the political level. When we talk this week about policies and structural adjustments, be brutally, diplomatically critical and frank. Share ideas, so that this is not just another buzzword seminar.

The last thing I was going to say is that on the United States A.I.D. side, our budget for Africa has stayed up at \$800 million US on a bilateral basis -- not what we put through the World Bank and the African Development Bank, not what we put through the CIGARs and the international research centers, and the national research centers, and the regional research centers, but what comes from our bilateral budget for Africa is the same, it has not been diverted over into Europe, to the Newly Independent States. It's still there.

We're with you, but we're looking for creative, honest, frank, straightforward talk in terms of the transformation of agriculture in Africa. I challenge you to come up with new solutions, apply solutions that you've learned in the rest of Africa to the new Southern Africa post-apartheid period. I think you've got a lot to be shared. Do it in a professional open and honest way as you go about your business for the next week.

Thank you for letting me open it, and I wanted to set a tone of open, honest dialogue that I hope will be the hallmark of what goes on here this week. Thank you very much.

APPENDIX B

AGRICULTURAL DEVELOPMENT IN AFRICA: FROM THE FRYING PAN INTO THE FIRE

by George I. Abalu⁵

I. INTRODUCTION

When Richard Goldman asked me to be guest speaker at this luncheon and gave me a carte blanche to speak on a topic of my choice, I convinced myself that the choice would be easy. After all, all I needed to do would be to take the subject of this symposium, "the transformation of African agriculture" define it as the process whereby African agriculture which, 30 years after independence is still close to being 100 percent subsistence oriented, is to be transformed into a highly efficient, commercially oriented, market driven structure; review my experiences with African efforts to mimic this process, and then try to reassure you all, contrary to my good judgement but in conformity with the usual wishful thinking, that, not to worry, the light at the end of the tunnel is just around the corner.

The apparent simplicity of the assignment set me thinking in a formal manner about the realities of African agricultural development, about how the agricultural transformation process is virtually nonexistent in many African countries. I have, therefore, decided to share with you this afternoon some of my thoughts about on-going efforts to transform African agriculture. I have chosen as my topic " Agricultural Development in Africa: From the Frying Pan into the Fire."

Let me explain the meaning of the expression "From the Frying Pan into the Fire": This is a creole expression used to describe a situation whereby a person confronted by a serious problem thinks he or she has found a solution to the problem only to find out that he or she is in a worst situation than ever before. My 15 years as a University professor of Agricultural Development in Nigeria combined with my present responsibilities as an international civil servant with the over-ambitious title of Adviser to Ministries of Agriculture in Africa, has brought me face to face, on many occasions, with the many contradictions associated with our attempts to confront textbook theories of agricultural development with the practical realities of African agriculture.

I have chosen to speak on this topic this afternoon not so much out of frustration that the battle to transform African agriculture is being lost on many fronts, but more to illustrate the magnitude of the change, both in attitude and in action, that would need to take place if the continent is to survive as a viable entity in the emerging global economic order.

⁵This paper was presented during a luncheon meeting on Tuesday, June 1, 1993.

Africa continues to make headlines throughout the world. The main message that these headlines carry is that of a continent in perpetual political and socio-economic crises, incapable of feeding itself and with an ever increasing number of hungry, helpless and dying people. The indications are clear: The majority of the continent's 650 million people are immersed in poverty, misery and despair. The symptoms of the crisis include rapid deterioration in the food security situation, ever worsening terms of trade, a rapid decline in the limited range of goods produced by African countries, high rates of urbanization, rapid increases in price levels, escalating debt burdens, and rapid population growth on an ecologically fragile agricultural resource base.

Peter Timmer (Seckler, 1993) defines agricultural transformation as " the process of converting household -oriented subsistence-type structures to commercial units that have highly efficient linkages to the urban and world economies". In practical terms, this means that African agriculture must grow enough food and raw materials for its rising population and new industries; produce enough exports to earn the foreign exchange needed to purchase essential machinery and equipment and service foreign debts; and, as productivity increases, release labor and capital for the development of other sectors. It must feed a population that will double in about 20 years. It must provide employment for a rapidly growing work force (50 to 80 percent of Africans earn their living from the land). It must service and settle a debt that would be close to US\$400 billion by the end of 1993. To crown it all, this must all be done in a sustainable manner.

Are all these possible under present conditions and current trends? Are these real expectations? Are we deceiving ourselves particularly in the context of the emerging new world order? I would like to focus on the realities surrounding these challenges in the context of the post cold war era in which we now find ourselves.

II. AFRICAN AGRICULTURE IN THE POST COLD WAR ERA

Where We Are Coming From

Since independence, many national and international agricultural administrators in Africa have toiled over how to best translate the felt needs and aspirations of people in the rural areas into well defined and logical projects, programs, and policies that are consistent with the overall development goals of African economies. They have searched, often in vain, for the best way to formulate the pressing problems of the food and agricultural sector in a correct and logical form so as to make them easily amenable to corrective action.

This search came to a head in the early 1980's following the recommendation of the Berg Report (World Bank, 1981) which concluded that the economic and financial crisis that was engulfing the African continent arose basically from domestic policy deficiencies in the post-independence period and recommended that these policies must be changed if African economies are to be transformed.

As of today, there is virtually no African economy that has not been touched by IMF/World Bank led reform measures. The IMF has been instrumental in the design and financing of the programs while the World Bank has been more involved in Structural Adjustment Lending (SAL) in support of the IMF Structural Adjustment Programs. These reform packages have focused on creating the correct policy environment for getting African agriculture moving again, integrating it more fully into the macro-economy and linking it to the international economy.

A number of reviews of the impacts of these reform measures have now been conducted. Although the verdict is not conclusive, the general feeling is that, in many cases, these policy reforms appear to have been ill-adapted to the African situation which is characterized by weak production structures, imperfect markets and weak linkages among the productive sectors. The basic criticism is that the reform measures concentrated excessively on achieving internal and external financial balances at the expense of basic structural factors that are important for both economic growth and socio-economic transformation (Green, 1989). By focusing mainly on the attainment of internal and external balances and changes in relative prices, the reforms relegated the important aspects of economic linkages and macro-economic integration, including productive employment, to the periphery of the development process (ECA, 1989).

Where We Are Going

One of the most conspicuous consequences of the cold war has been the unleashing of a number of humanitarian and socio-economic crises throughout the world but particularly in Africa where the forces that had been repressed for so long by artificial stability created by the cold war are exploding and raging out of control. Crumbling economic systems, civil strife, inoperative political systems, drought, corruption, AIDS and other debilitating diseases have placed most countries in Africa in a permanent state of emergency.

Man-made emergencies in Africa resulting from civil wars, corruption, bad governance, etc., may be linked to the continuing search for African solutions to African problems following the continent's colonial past that had, to some extent, prevented Africans from thinking through their own problems, and forced them to adopt alien values and systems. Natural emergencies resulting from desertification, drought, poor rains, etc., have also compounded and exacerbated the crisis. The causes and consequences of the crises are not rooted purely in political developments but also in the economic, and social conditions unfolding in the continent.

The end of the "cold war," the discredit of the "command economy," and the emergence of "democracy" around the world have all combined to set the context for a redefinition of the development process in the new world order and the role many development organizations including the United Nations system in this new world order. The UN's "Agenda for Peace" (Boutros-Ghali, 1992) calls for the organization to strengthen its capabilities in preventive diplomacy, peace-making and peace-keeping, and post-conflict peace building. The UN perception of this agenda is to approach emergency, humanitarian and long-term development activities as part of a development continuum

into which the development dimension must be built from the very outset. This perception represents an attempt to comprehensively address the manifold complexities involved in development and to prepare for the structural and institutional changes required to prevent, resolve, and overcome the numerous crises engulfing several countries of the world. It is also an attempt to attack the root causes of the underlying political and socio-economic problems facing many developing countries of the world.

Indeed, there is now broad consensus and increased confidence in the UN system to promote long-term development within the context of peace and stability through out the world. This renewed confidence in the Organization is perhaps matched only by the apparent willingness and resolve of its member States to further support and nurture the ideals of the UN Charter. The Organization itself is no doubt keenly aware that it has to live up to the challenge and ensure that along with enhancing its effectiveness in peace making and peace keeping, it also finds lasting solutions to the persistent socio-economic and political problems of the world. Hence the recent prominence given by the Organization to the launching, managing and co-ordination of emergency and humanitarian efforts pursuant to standing and new mandates by the General Assembly for longer-term socio-economic development.

In Africa, one useful way of operationalizing this UN mandate would be to categorize countries of the continent into:

1. Countries on the verge of socio-economic conflict;
2. Countries in civil war/disaster situations;
3. Countries emerging from civil strife situations; and
4. Countries in transition from emergency to rehabilitation.

The UN's mandate in Africa will, of course, have important implications for on-going and future efforts by national governments and the international community to transform African economies. I would like to now spend a little time looking at our experiences in one of the continent's hottest trouble spots, Somalia, to illustrate the realities surrounding efforts to transform African economies in general and African agriculture in particular. I choose Somalia because it represents a "nightmare scenario" of where many African countries could be in the near future if present trends continue.

III. SOMALIA: FROM EMERGENCY TO TRANSFORMATION

Following the overthrow of the Siad Barre Government in January 1991, Somalia started a rapid plunge into political and economic anarchy. Within months , the state had lapsed into complete lawlessness and economic bankruptcy. The country divided itself into hostile clans and camps and local and national administration grinded to a halt.

In the ensuing chaos, the country's infrastructures were largely destroyed or ceased to function. The entire banking system ceased to operate. The security situation deteriorated rapidly and thousands of lives were lost and millions of people displaced.

A major international emergency and relief effort spearheaded by the United Nations was mounted in the country to address the crisis. This effort soon floundered following the worsening of the security situation. Food convoys were attacked and the warehouses of donor organizations looted and their personnel killed. To arrest the continuing deteriorating situation, the UN authorized a major military intervention in late 1992. As a result a certain degree of stability has now been restored in the country although the longer-term outlook is still uncertain. On the political front, the representatives of the warring factions and clans are meeting and negotiating under the auspices of the UN to return the country to peace and democratic rule.

These developments have now raised hopes that the worst of the emergency is now over and fuelled efforts to move Somalia from the emergency and relief stage of humanitarian assistance to a stage of reconstruction and longer-term development. At a recent meeting held in Addis Ababa, Ethiopia to coordinate humanitarian assistance for Somalia, international organizations, donors and Somalia participants requested ECA and UNDP to take the leadership in the preparation of a Medium Term Plan (MTP) for the Reconstruction and Rehabilitation of Somalia so as to provide an overall framework for financial and technical assistance with a long-term vision of the economic development of the country.

I believe this provides a perfect opportunity to trace a number of important issues that are usually associated with national and international efforts to transform African agriculture. The UNDP and ECA have now initiated a project to produce the MTP for Somalia. UNDP has agreed to finance the project on behalf of the UN. The project will be undertaken within the framework of UNOSOM which acts as an umbrella and coordinating organization for all programs undertaken by UN organizations in Somalia. The project would involve ECA, UNDP, the World Bank, UNOSOM, eminent Somalis, and possibly others and have its Project Office in Mogadishu, headed by a Project Manager. This takes into account the fact that a number of organizations, donors, and agencies are interested in being involved in the preparation of a post-conflict long-term development plan for Somalia.

Let me now use the Somalia situation to illustrate a number of the contradictions that are usually associated with efforts to transform African agriculture. There are several of these issues that can be raised here but I am just going to concentrate on a few.

Macroeconomic Framework

The first objective of the planning exercise for Somalia is to come up with a strategy for the phased intervention that must accompany relief and reconstruction efforts if they are to lead to economic normalization rather than the interruption of economic activities. There is also a need to

assess the prospects for creating a stable macroeconomic framework in light of a possible shift in economic direction vis a vis the recommendations made under the Structural Adjustment Program adopted by Somalia during the late 1980's. The macroeconomic focus is, therefore, to determine the need and feasibility or otherwise of establishing a macroeconomic environment conducive to trade, attracting foreign investment, open exchange markets, improved financial intermediation, and public sector resource mobilization.

Decentralization and Institutional Development

Little remains in place of the past system of public and parastatal institutions. At the same time, there exist modest beginnings of a new institutional framework based on greater decentralization and local control. There would therefore be need to examine institutional alternatives to those that existed in the past, in support of the current reconciliation effort. This would be an extremely sensitive task which combines political and economic considerations on which there may exist little consensus in Somalia at this point. The danger is that regional institutional development will be incompatible across regions, and between the regions and a future central government.

Agricultural Development

Agriculture during the late 1980's employed more than 70 percent of the labor force while producing nearly 65 percent of GDP and almost all exports. Livestock has been the dominant source of income accounting for 80 percent of total agricultural output and a similar share of exports. Among crops, basic staples produced by smallholders for the domestic market represent the bulk of agricultural crops. Bananas and citrus crops are the dominant export crop with markets in Italy and Saudi Arabia. Much of agricultural production depends on unreliable rain. Of the 800,000 to 1 million hectares cropped, only 20 percent can rely on irrigation (mostly gravity). A long-term hope has been to utilize some of the remaining arable land through the Bardere Dam. However, its cost appears prohibitive, and the scheme has been questioned by environmentalists. In general, productivity of crop production in Somalia has been low as a result of the widespread use of low level traditional technologies, outmoded techniques, lack of infrastructure and irrigation systems, small domestic markets, and legal problems concerning land tenure and ownership of water rights.

Some Major Transformation Issues

There are a number of critical issues surrounding the effort to construct a transformation program for Somalian agriculture an empty exercise. While they come out more sharply in the Somalian case because of the drastic circumstances in which the country now finds itself, they are of equal significance and relevance to many other African Countries.

The Level of Destruction: The impact of the Civil War and the need for rehabilitation must be established so as to have an idea of what needs to be done. Somalian agriculture was devastated by a combination of long-term drought and war, leading to the loss of land and livestock, machinery and agricultural infrastructures in the form of extension services, market and credit facilities, and support services. Livestock health has suffered; the irrigation system requires an overhaul; seed stocks have been depleted; and some fishing vessels were stripped of their motors or destroyed outright (particularly in Kismayo). There is therefore need to determine the extent of the damage, and how it affected different regions. A plan for the phased revitalization of the damaged and/or inoperative agricultural support services, including agricultural research and extension services, marketing and credit operations, veterinary clinics, fishery support services, and improved management of irrigation facilities must be worked out.

The Role of the Private Sector: The eagerness to avoid the excesses and high handedness of government that resulted in the civil strife in Somalia, has given birth to a new enthusiasm for more private sector participation in the emerging Somalian economy. The international community has encouraged this enthusiasm by encouraging the participation of private individuals in aid dominated economy now operating in the country.

There is need to be careful here and try not apply the principles of privatization in a doctrinaire manner. The lesson to be learnt from past efforts in Africa at privatization in African agriculture is that attempts to apply it in a doctrinaire manner is likely to undermine growth and the transformation of the sector and jeopardize social welfare and human conditions. It is insufficient to simply assume that private enterprise competing to maximize profits will automatically lead to optimal resource allocation for the country. The fact is that most private enterprises operating under the structurally distorted and imperfect market situations in Africa, often seek to maximize short-term profits and, in the process, invest in ways that reproduce existing distorted resource-allocation patterns. Experience will suggest that there have been in the past and there will continue to be in the future, areas of free-market and government successes and failures. The record in Africa shows that some of the most successful institutional services to African farmers have been provided by governments who knew precisely in which areas to intervene and how to intervene efficiently. On the other hand, the provision of inadequate institutional support services for agriculture has also often resulted from circumstances of excessive government intervention, and unwise or inefficient intervention as was the case in Somalia before the civil strife.

Free Markets: Another issue has to do with the price policy regime that historically has governed agriculture in Somalia. This includes the role of parastatals which exercised monopoly power in commodity markets through a system of administered prices and the production and service cooperatives which many farmers were asked to join as well as the fate of state farms that had not been sold by 1990. Virtually all the international aid and donor community are of the view the state administered real prices for the agricultural sector have been kept lower than the equilibrium level under free market conditions and that the way to significantly increase the value added in the agricultural sector would be to allow all prices to be freely determined in a free market situation.

In this regard, the experiences of other African countries with reform programs would suggest that price adjustments alone and by themselves will not lead to a higher equilibrium level of output. On the contrary excessive dependence on market forces for getting the prices "right" in structurally distorted and imperfect market situations is likely to lead to a worsening of the inflation situation through sharp rises in production costs and mark-ups, and cause deviation from desirable production and consumption patterns and priorities, and derail the entire reform process. Furthermore, simple-minded price reform measures are likely to do very little to help the majority of small-scale farmers who usually need help the most since almost all the benefits from higher prices depend on marketed and not total output. There may therefore be a case for deliberately designing and administering policy reform measures to ensure that small scale farmers fully participate and benefit from any positive impact from increased agricultural prices.

Market Share: A second concern is with the impact on agriculture of the ongoing relief operations, which make farming unprofitable. Farmers at present have lost a substantial part of their traditional markets, both domestic and export. The demand for domestic farm products has diminished as a result of reduced incomes, but more so because of the import of cheap food. There is a need to devise a credible program to rebuild domestic farming and to phase out subsidized imports.

The Debt Burden: Even before the onset of the war, Somalia had already defaulted in its loan obligations and was in bad standing with the major international financial organizations. Its outstanding loan obligations are in excess of US\$15 billion. It is unlikely can or would ever be in a position to repay this loan. However, if forced to, Somalia, like most other African countries will try to depend on its agricultural trade surplus to finance its imports and to service its debts. The country's heavy debt burden in the face of the low value of its exports will force the country to attempt to boost export earnings through an environmentally damaging expansion of its principal exports - livestock, bananas and citrus. This is bound to lead to environmentally degrading livestock and crop production practices.

Perhaps the most humiliating testimony to the country's vulnerability to pressures to obtain foreign currency is the rumor that many attempts have been made by a number of developed countries to dump highly toxic waste in the country.

IV. CONCLUSION

Africa needs a coherent strategy to get its agriculture going again and to integrate the agricultural sector into the larger national, regional and international political economy. Major adjustments will be needed in a number of areas including a sensible role for the private sector, a regulated free market system, sensible environmental considerations, and tested macro-economic policies at the national, regional and international levels, and both in developed as well as in

developing countries, to create the enabling environment for sustainable agricultural transformation to take place in the continent.

Unfortunately most African countries cannot create such an environment on their own and its operationalization would require much greater co-operation among them. There is no doubt that if rapid economic transformation is to be achieved in African countries, concerted action and joint efforts would be required so that the different countries in Africa would be able to develop within a common framework that takes cognizance of their peculiar needs. It should now be obvious to every one that African countries working alone would find it very difficult to achieve this important development objectives. This is particularly true with respect to the transformation of their agriculture. Increased trade among African countries, collaborative agricultural research programs, the implementation of joint food security strategies, joint pest control management, joint negotiation strategies for debt relief and/or forgiveness and joint natural resource management, particularly river basin development are just a few areas where regional cooperation would be essential in Africa.

While the continent's experience with regional cooperation and integration has not been very successful in the past, the recent treaty establishing the African Economic Community opens up new opportunities for cooperation in the development of the continents agricultural, forestry, livestock, and fisheries resources as well as in the promotion of integrated production structures. This is the direction in which the new world order is moving. Africa must also move in this direction.

REFERENCES

- Abalu, G. I. 1992. "Planning for African Agricultural Development: Has On-Farm Research Made a Difference?" Invited paper presented at the CIMMYT Workshop on the Impact of On-Farm Research in Southern and Eastern Africa, Harare, Zimbabwe, 23-26 June 1992.
- Amin, S. 1976. "Unequal Development: An Essay on the Social Formations of Peripheral Capitalism. *Monthly Review Press*. New York.
- Binswanger, H. and P. Pingali. 1988. "Technical Priorities for Farming in Sub-Saharan Africa." *The World Bank Observer* 3(i): 81-98.
- Boutros-Ghali, B. 1992. "An Agenda for Peace." New York, NY, United Nations
- Delgado, C.L., J.W. Mellor and M.J. Blackie, 1987. "Strategic Issues in Food Production in Sub-Saharan Africa" in *Accelerating Food Production in Sub-Saharan Africa*. J.W. Mellor, C.L. Delgado, and M.J. Blackie. eds. Baltimore: Johns Hopkins University Press.
- Desai, G.M. 1990. "Fertilizer Policy Issues and Sustainable Agricultural Growth in Developing Countries" in *Technology Policy for Sustainable Agricultural Growth*, Institute Policy Brief No. 7, pp 22-23. Washington, D.C.: International Food Policy Research Institute
- ECA. 1989. *African Alternative Framework to Structural Adjustment Programs for Socio-Economic Recovery and Transformation*. Addis Ababa, Ethiopia: ECA.
- Green, R.H. 1989. "Articulating Stabilization Programs and Structural Adjustment," in S. Commander, ed. *Structural Adjustment and Agriculture: Theory and Practice in Africa and Latin America*. London: Heinemann.
- Johnson, O.E. 1989. "The Agricultural Sector in IMF Stand-by Arrangements," in S. Commander ed., *Structural Adjustment and Agriculture: Theory and Practice in Africa and Latin America*. London, Heinemann.
- Timmer, C. Peter. 1993. "Keynote Address: Setting the Stage," in D. Seckler, ed. *Agricultural Transformation in Africa*. Arlington, Va: Winrock International Institute for Agricultural Development.
- World Bank. 1981. *Accelerated Development in Sub-Saharan Africa*. Washington, D.C. World Bank

APPENDIX C

AGRICULTURAL TRANSFORMATION IN ZIMBABWE

presented by Mandivamba Rukuni⁶

Rukuni: I'm going to talk this afternoon on the topic agricultural transformation in Zimbabwe, and I was going to start off by saying that I will take pretty much a institutional approach to this topic.

Yesterday, I listened with a lot of interest as Dick and his colleagues presented their analysis because I thought if this kind of analysis can be done to the Zimbabwean situation, it would probably bring up very interesting results regarding whether or not Zimbabwe is ready to jump into a final phase of agricultural transformation. By way of introduction I have broken Zimbabwe's agricultural transformation process into four phases.

In the first phase, Zimbabwe invested quite heavily in what I'm going to term the prime movers of agricultural development, and I will define that later. I'm looking at a period from at about 1925 to about 1950. Then follow two phases during which elements of an agricultural revolution took place. The first one was a kind of agricultural revolution on white-owned large-scale commercial farms, starting from 1950 to about 1980. Then followed a mini production revolution, for lack of a better term, on black-owned smallholder farms, from Independence in 1980 to 1990. The final phase is the one that Zimbabwe is looking at now, a period between now and maybe the year 2025 where the question "Can Zimbabwe complete a transformation?" will be answered.

The two agricultural revolutions I've talked about were both incomplete revolutions. The one on large-scale farms was incomplete for the reason that it only supported a few thousand large-scale farmers. After Independence, although successes were scored by Zimbabwe with smallholder agriculture, we know now that this probably involved just 10 to 20 percent of smallholder farmers. So, we're talking here of two phases of incomplete transformation, although these probably have enough elements to call for a complete transformation. The major point behind my talk this afternoon is to say Zimbabwe will need a period of one hundred years to complete the process of agricultural transformation: 1925-2025.

Taking the first phase of 1925 to 1950, the period during which the major prime movers were put in place, I will list the six major prime movers of agricultural development and indicate how the Zimbabwean government of the time accomplished this.

The six major prime movers include:

⁶Presented during lunch on Wednesday, June 2, 1993.

- 1) Land. Land in the sense of both acquiring more land for agricultural production, as well as, of course, trying to get more people on land, so that you get agriculture moving.
- 2) New technology, which is generated by investments in both public and private sector initiatives to continually come up with new technology that suits farmers and changing environments that farmers may have to face.
- 3) Human capital, starting from highly professional levels of people to managerial levels, technical levels, all the way to farmers.
- 4) Biological and physical infrastructure, which includes large-scale improvement of livestock herds and plantations as well as investment in physical infrastructure such as roads, dams, irrigation, and so on.
- 5) Effective farmer support institutions. This is something that I'll continually come back to.
- 6) Favorable economic environment.

Now, the thing that I'd like to stress about the six prime movers is that, with the exception of maybe bringing more land into cultivation, all prime movers are long-term investments, particularly on the part of the public sector. None of these prime movers, starting from technology, all the way down to creating a favorable economic environment, were created over a short space of time. It took a minimum of 25 years to get all this in place.

The second and equally important point is that for transformation to start taking place, five or six prime movers must be in place at the same time. There's no single prime mover -- history seems to be on my side on this one -- no single prime mover can lead to a transformation or an agricultural growth which is sustained in any way. So, a price increase may cause a jump, but it won't be sustained until all the prime movers are working in tandem.

Now, during this period I just referred to, 1925-1950, all the prime movers were in place, but I'll just pick out two aspects to highlight how it happened. Of course the most widely told story about Zimbabwe is the maize production revolution. It took seventeen years of maize breeding research in Zimbabwe, 1932-1949, to come up with the first commercial hybrids in this country. In 1949 Zimbabwe became the second country, after the United States, to have hybrid seed commercially available to farmers. That actually triggered the first production revolution on large-scale farms. It took forty years of sustained research (1925-65) before cotton was commercially grown by farmers in this country. If you look once again at the Zimbabwean history books, smallholder farmers were not growing cotton in this country until the mid-Sixties, after good varieties were in place, and technology to arrest pests and diseases was in place.

The next phase is the agricultural revolution on white-owned large-scale farms between 1950 and 1980. I've just gone through how the prime movers allowed this process to take place. We also know soon after World War II, the world economy in general was on the upbeat and this allowed Zimbabwe to also have tobacco on the world markets. Fertilizers, particularly nitrogen fertilizer, became available commercially, and that really assisted in the massive increase in production on these farms.

When I refer to investments in technology generation, I mean not only the ability to produce the right technology for farmers at the point in time but the ability to adapt to changing circumstances. In 1965 when Ian Smith, then Prime Minister, declared UDI (Unilateral Declaration of Independence) and this country faced sanctions, the tobacco industry collapsed. In a short period, farmers had to diversify from tobacco to other crop. Because of the strength of the agricultural research institution in this country, this was achieved in a space of just five years with crops like wheat and soybean, among others, replacing tobacco.

I must also hasten to add that throughout this period, the large-scale commercial farmers did receive quite a bit of support from government. I mean here and there subsidies were put in place. In a number of classic cases, the government gave subsidies to these farmers to kick off the crop and later on removed the subsidies. That particular approach actually worked in this country. I just wanted to say that for the record. For too long in this country we've had consumer subsidies which don't directly assist the transformation process. If we're going to have any kind of subsidies at all at this point in time, I would lose less sleep if those were producer subsidies.

In Zimbabwe, the question of fertilizer in the transformation process was very important. In spite of what I've said about improved varieties and so on, there are at least a couple of papers that have demonstrated that fertilizer was the single most dominant factor in actually pushing the growth rate of production. While it cannot be generalized about Africa, it was a very important aspect in Zimbabwe.

So, there it is: 1950 to 1980, large scale commercial farms having what I'm calling an agricultural revolution of a kind -- but an incomplete transformation because we're only talking about 6,000 or so large-scale commercial farms.

The next phase began in 1980 with Independence. In the initial years of independence, Zimbabwe got quite a bit of praise for what appeared to be a positive agricultural policy which led to a significant increase in production of maize and cotton on smallholders-- two- to three-hectare-- farms, thereby kind of blowing the myth that smallholders cannot be major forces in economic transformation of African nations.

But this transformation took place mainly between 1980 and 1985, during which smallholder farmers increased their share of both maize and cotton production from a forty year average of less than 10% to an average of over 50%, where it has remained until today. This production growth took

place over that five year period, but it has more or less stabilized at that level. For reasons that I'll go through in a minute, this, too, is an incomplete transformation.

I'd like to quickly go through some of the major policy reforms and institutional reforms that were put in place at Independence in 1980. I'll start with marketing. You'll find that marketing was a major constraint to smallholder production until Independence, and it wasn't until Independence that the major marketing goals in this country started putting infrastructure into the communal areas. As an example, the Grain Marketing Board, which purchases most of the maize, had only three depots in what we call our communal areas here where the small holders are; only three depots until Independence. By 1985, ten more had been built in, and in addition to those a number of collection points were built in these communal areas. A similar kind of growth in cotton marketing depots was also experienced during the same space in time.

Credit. Up until independence smallholders could not access formal credit from the Agricultural Finance Corporation. Then in 1980 it became possible for these farmers to get credit, and about 18,000 smallholders got credit. The number increased on a yearly basis to a peak of about 77,000 in 1986 or '87 and from then on picked up and dropped back. Today it's more like 40,000. The Institutions simply weren't suited to serve smallholder farmers. In contrast, during the same space of time, the large-scale farmers dropped their use of FC loans from 22,200 in 1980 to 700 in 1986, or 87. But those 700 farmers were still borrowing several times over the amount of loans than 44,000 smallholder farmers.

Agricultural research and extension also pose serious institutional challenges. Research was really geared to large-scale agriculture up until Independence. At the Independence, there was a directive to try and address the needs of smallholders and a few new initiatives were put in place, a bit more on farm research. Looking at some of the new ideas that have been developed and needs of smallholders, by and large the linkages between research and farmers has improved.

Extension. Up until Independence, Zimbabwe had two separate extension services, one for large farmers and another for small farmers. These were merged at Independence. The end result, with other modifications, reduced the extension:worker ratio from about 1:100 to about 1:800, so a measure of improvement. Part of that improvement was because extension methods moved from a more elitist approach of training what we called here "master farmers" toward a group extension, where agents deal with a larger number of farmers at a time.

Zimbabwe also experienced the training visitation system, which is a system that is kind of universally prescribed by the World Bank. Zimbabwe, tried that out for a few years but then rejected it on the basis that it was expensive, inflexible, and incompatible with existing methods of extension. So, there you are. One of a number of other prescriptions that did not work in this part of the world.

To complete this story: the transformation took place, but it fizzled out after five to six years. Now we know that on an average only about 10% to 15% of smallholders actually sell excess produce to the marketing boards every year. And maybe another five to ten percent on top of that

will probably go in and out; some years they have a surplus, some years they don't. So, once again we are talking of an incomplete transformation.

How can Zimbabwe complete the transformation between now and the year 2025, if it's going to do it within one hundred years. As I said when I started, I will probably bring up a few things here which are a bit unconventional to this kind of audience, but I'm sure you have all heard this kind of talk before, so we'll just get on with it. I think the most important thing for Zimbabwe at the moment, if it's going to achieve this transformation in the next 25 to 30 years, is to once again mobilize political support for agriculture.

In Zimbabwe, you'll find that behind the major improvements in agriculture's prime movers was a lot of political support for agriculture: political support initially in the Colonial period through a very strong farmers union for commercial farmers, which is still here today. This organization I think employs up to 120 professionals and has a ten-story building in downtown Harare.

Agriculture is treated differently in the political process in industrialized countries than in most countries in Africa, and this issue is of fundamental importance in understanding Zimbabwe's agricultural successes and agricultural stagnation in many other African countries. With few exceptions agriculture is heavily taxed in most countries in Africa and is used as a national parking lot for the poor. At the same time, civilian- and Army-backed governments have generally reinvested only a token amount of the tax revenues extracted from farmers back into rural institutions infrastructure and villages. By contrast, virtually every industrialized country subsidizes its farmers and consumers and donates food abroad, and still has a chronic problem of farm over production.

So, basically here we're talking of no political support for agriculture in Africa. Until people like you and me and donors start giving support to farmers to organize themselves, farmers unions and so on so that they create a political base, I don't see how this need to reinvest or invest more in prime movers is going to take place; even here in Zimbabwe over the next twenty-five to fifty years. This is particularly true given that we are now further constrained by the need to cut back private expenditure because of a sectoral adjustment program.

The second point I'd like to bring up regarding what needs to be done to complete the transformation relates to land. Land is undoubtedly the reason that led to the liberation war here in Zimbabwe and that issue is not going to disappear. Zimbabwe took a very cautious approach to land reform at Independence, which I agree with. I didn't think they needed to go the Ethiopia way or the Tanzania way. But the point is this: now we've got an economic case for smallholder agriculture, and if a land reform program is going to take place and a number of things are done properly, like for instance settling more smallholders in higher potential areas, ensuring that there's adequate infrastructure in those areas, and provided institutions are reforming enough to be able to assist smallholders, then I think that there's a very strong case here for a land reform program allowing more smallholders to go back into agriculture and try to get it moving in the next twenty-five or thirty years. This restructuring of the institutions to be able to support smallholders to me is very important. In fact, the starting point in figuring out how to restructure farmer support institutions to

assist the majority of smallholders is to conceptualize basic agriculture support institutions as a system of interactive development institutions. The problem is that with most donor-funded activities and government-funded activities this is done on a project-by-project basis, and thereby we find that supporting institutions are treated individually rather systematically, and that means you lose all the spillovers, the linkages, the synergies that are necessary for these institutions to work in tandem for these smallholders.

Finally, a very important issue for any kind of transformation in Africa is how to manage national food economies. This is a very, very grey area in Africa, and in Zimbabwe it has been demonstrated over the last few years that governments really have to pay attention to this issue. We now know that after two incomplete transformations we still have only 10% of the population producing surplus. The rest need to get their food through other means one way or another, and even if Zimbabwe goes through a complete or almost a complete transformation the issue won't die away. There's evidence now from the rest of the world that the food security issue is to be balanced all the time. You can have food available one way or another, but it doesn't mean that people are going to have it in their stomachs.

Someone was giving me an example of India in 1985, during the great African Famine, I think India donated 100,000 tons to Ethiopia, but in India 200 million of them are dying. This is the thing, it's a dicey situation. We have to insure that as we work to get agriculture going so that agriculture can move the rest of the economy towards the industrial phase, we also have to ensure that in the process those members of the community who do not have full stomachs gain access to a calorie-adequate diet.

Thank you very much.

Question: I have two questions. First, do you foresee that the agricultural transformation will be strong enough to be the leading edge of an economic structural transformation? Second, would you give us a clearer idea of what institutional issues are involved supporting technical change?

Rukuni: I think that it's going to be difficult at this stage to have an agricultural sector in Zimbabwe that's not only growing at a terrific pace, but is providing enough of an engine of growth for the manufacturing and the industrial sector to then create enough jobs for the basket cases. That's what you're talking about Dunstan. I think we are not - as a matter of fact, as I say, I've been taking a lot of shortcuts here so there's a lot of gaps that I missed.

As a matter of fact, the first revolution on large-scale farms, the initial phase of which was 1950 to about 1961-62, was actually the assumption that this was what was going to happen. This country was supposed to be another Australia or another Canada, whereby after that measure of growth in that sector, which in those days meant the rest of the blacks would then be absorbed in the industrial sector.

Now, that did not take place. So, one of the things that I think needs to happen is that you need more farmers producing a surplus on the land first, and it appears that although it may not be it definitely can be all the small-holder farmers, who number a million in Zimbabwe. But even if you talk a third of those, then you are actually talking about those having better access to technology, and better access to institutions which can assist them, and here I'm talking right across the board from your extension and so on.

But your second question, Dunstan, on the technology, when I refer to this institutional approach that I am proposing, I would define sustainable agri-research system of any country as one that will be able to continually to provide needed technology as situations change.

So I'm not talking about a specific technology here, I'm talking of over time, and during those days when the research service in this country was very strong the service was able to change its focus and provide farmers with needed new technology.

Now, Zimbabwe has lost, to some extent, that capacity. With the research system it has lost a lot of its human capital, the government has invested in research on a diminishing scale, and in real terms this has gone down about 20% in ten years and so on. That actually means that more of the work that you want done, Dunstan, cannot be done because that comes more expensive than on-station research.

Let's just go around the table this way.

Question: Your talking about empowering rural people but much of what you are saying has a top down kind of ring to it. How do these things fit together?

Rukuni: I wasn't trying to be too optimistic. What I was really trying to say was before you go for direct empowerment of the rural people, which is more difficult than what I'm suggesting, what I'm calling political support for agriculture, I'm taking both a bottom-up as well as a top-down approach.

I'm saying it appears that not only within governments, but also within the international community, even amongst the intellectual communities of our African nations, you still find that people are looking for short-cuts. People are not accepting the fact that maybe countries like Zimbabwe in South Africa cannot take short-cuts for development. Maybe we can just industrialize these countries without an agricultural transformation. What I'm arguing is if we get a political support meaning, even the donors, even the World Bank, if you and I are able to convince the powers that be that we cannot transform these economies without an agricultural transformation, and in the process we empower or find ways of ensuring that farmers also develop a voice so they can shout and scream for the things that they need to transform their own situation.

So, you are right, I'm not calling for a revolution, I'm simply saying even if we can just get a government like Zimbabwe to increase its percentage of agriculture GDP agriculture from 5% to 15% over a space of five years, you've done great. OK.

Question: Can you elaborate some on the issue of land tenure?

Rukuni: I threw a bomb yesterday yes. Thank you Dr. Ackello. The land tenure, the land tenure question is very important in Zimbabwe. I didn't go into detail on the land resettlement program because of time, but one of the major downfalls of the Zimbabwe land resettlement program was lack of a proper land tenure policy, and I think, I really don't know, some of the government officials here could comment -- I think the government is actually trying to find ways of actually coming up with a land tenure policy now before embarking on another massive resettlement program, and our women in Zimbabwe have now, I think a new law has been passed actually giving the title or access to land by women. I mean the women have more access to land, as much access to land as men, and widows can inherit husband's land and all that kind of thing.

Like my good friend Glenn pointed out yesterday, I actually think some of these problems related to the gender issues in the African culture are misrepresented in the African situations, because most African households, work is family's. It can be a woman's crop - speaking for Zimbabwe -- a woman's crop doesn't mean that only the woman eats the crop or sells and uses the crop. It's just the division of labor. At the end of the day all these are household assets.

But let me move on to the marketing question. I also did not go to town on this one because of time, but one important contribution of the private sector to the transformation, particularly after independence, is the seed industry, particularly maize seed interesting. It's just amazing how this industry has allowed smallholders in the furthest corner of Zimbabwe to have access to seed. And we are talking here of different varieties, different packs, fifty kgs, twenty kgs, five kgs, even less than one kilogram. They can go into a shop and buy a pocket of seed.

So, just using that as an example. There are other examples of course on your chemicals and fertilizer.

On the human resource development. I believe that Wilfred could give us a good definition of a good national agricultural research system. But I would say that that system has to be all-embracing, it's got to be able to reproduce itself, so it includes the department of research public sector, private sector, universities' faculties of agriculture, colleges producing technicians and so on -- because if the system cannot reproduce itself, in the department of research they need people with these kind of skills and level of training. And if the university cannot produce these people, too bad. You're going to have to send those guys overseas before you can make progress.

And the experience here in Zimbabwe is that until our universities are able to give strong post-graduate programs, then they are continually going to be unsustainable, and they won't be able to reproduce themselves.

On extension somebody made a good point to me yesterday and said, Did you say only lousy technology needs good extension? I said yes. An oversimplification, but makes the point. I was just trying to really make the point.