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Global Economic Trend and Impact on Agriculture

and the CGIAR in Africa

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## **Introduction**

Distinguished participants, ladies and gentlemen:

It is a pleasure for me to participate in this conference and to share with you some of observations about the future of the CGIAR and African agriculture. And I say it's a true pleasure from my heart.

Some of you may have already known that my affiliation with CGIAR goes early in my career. I was a member of TAC. But more important than that, the CGIAR gave me the opportunity to become a good agricultural economist.

When the President of World Bank, Mr. Zoellick, offered me the position of Senior Vice President and Chief Economist- in his statement, he specifically mentioned that I was a very good agricultural economist. And we know that most of the poor people in the world today live on agriculture. And if you want to help the poor people, we need to bring changes into agriculture, increase the productivity, and also reduce uncertainty and volatility. This is a very important task of the World Bank.

But how come Mr. Zoellick mentioned me as a good agricultural economist? The CGIAR gave me the opportunity.

When I returned to China in 1987, I had the opportunity to participate in one research project commissioned by IRRI, the International Rice Research Institute, and to work on the rice technological innovation in China, and the impact of this innovation on the world economy. Through the project I wrote eight articles, and published in leading international agricultural economics and development journals, and those eight articles established me as a respected agricultural economist.

I would say, if there was no CGIAR, I wouldn't have had the opportunity to become the Senior Vice President and the Chief Economist of the World Bank.

## **Achievements of the CGIAR System**

I also would like to take this opportunity to congratulate the CGIAR on achievements which have been obtained since its founding in the 1960s. CGIAR was established in the 1960s because, at the time, the world faced the issues of hunger and population explosion. People were afraid the world might not be able to produce enough food to feed the population. Through the Centers, CGIAR brought the Green Revolutions to the world and increased the grain output. Although the population increased from 3 billion in 1962, to 6.5 billion--more than double--now, we have enough food to feed all the population. This is an important mission of CGIAR, and CGIAR has accomplished this

objective excellently.

The CGIAR system is not only a network for technological innovation. CGIAR is also an institutional innovation. We know that the 15 Centers, have maintained the technological excellence. But it's the institutional innovation of the international Centers working with the national Centers that has made important impact. Agriculture technology is location-specific. As these international Centers are working with national Centers, they can transfer new technologies to the developing part of the world effectively.

Also, this kind of institutional innovation changed the way we manage genetic resources, natural resources management, and in exchanging country experiences. Also equally important is the CGIAR's contribution to capacity building in the developing countries. Because of its accomplishments, the mission of the CGIAR has been expanded. In the early 1970s, the CGIAR membership was only 18 national research systems and donor agencies. The active member stakeholders in the CGIAR now are about 64 donors and national and regional agricultural research systems. This partnership is an important contribution to sustain the technological innovation that CGIAR has brought to the developing part of the world.

That achievement is significant, but the mission is not completed yet. We have the ability to produce more food than is necessary to feed the population. However, there are 850 million people still suffering from hunger. That's one aspect of the challenges facing the CGIAR.

As Joachim von Braun mentioned yesterday—the grain price fluctuation is large. At the beginning of this year, price surged, and with such high prices, many poor people could not afford adequate food. As a result, more than 30 countries in the developing part of the world have experienced some kind of social unrest. And because of the price increase, about 100 million people, slipped back into poverty. Because of the price surge, the global trading system basically collapsed. More than 40 countries imposed export tax and export ban on food grains.

Grain prices have dropped. Compared to the peak prices a few months ago, the grain prices are more than 40 percent lower now. With such a large reduction in prices, it is hard for the small farmers—to adjust. Most farmers in the developing world are small--they don't have the ability to cope with such fluctuations, and this is an important challenge to the CGIAR.

### **Current and Future Challenges facing the CGIAR**

Because of these factors, the meeting here today is important to discuss the future direction of the CGIAR, how to improve its management in order to fulfill its mission of providing the food to the growing world population, and help farmer maintain their prosperities and improve the environment.

**Old Challenges:** The challenges facing the CGIAR,- some old, some are new - need further attention. For the old challenges, we know that the demand for food will continue to rise. The world population, currently about 6.5 billion, is likely to reach 7.6 billion by 2020, and could reach 9.2 billion by 2050. With more population, certainly the demand for agricultural products will increase proportionately.

In addition to population growth, income also increased, especially in the last decades. Household income accelerated in many parts of the world, including emerging markets like China, India, Brazil, and in Africa. In the last ten years, more than two-third of the countries in Africa realized income growth rate of about 5.5 percent. This kind of income increase I hope, will continue. With income increase, people diets change. People eat more meat which has to be converted from grain. The demand for grain will increase. According to IFPRI and FAO, in the year 2000, Latin America, Asia, and Africa imported 85 million tons of grain. By 2020, their import of grains will increase to 261 million tons. We need to produce more.

While the demand for grains will increase, important constraints will limit the supply. Agriculture production requires land. But with the population increase, more land goes to housing that would be taken out from crop land. With growing industrialization there will be the increasing need for roads and for transportation infrastructure, also to be taken out from cropland. Land available for agriculture is decreasing. Except in a few countries in Africa, where there is still some virgin land for expanding cultivation, for most parts of the world, that land frontier has been closed.

To address this situation we need to learn more about how to increase the yield in order to feed--to meet the increase in demand. These are challenges that the CGIAR system faced 40 years ago, and it's still a challenge that we are facing today.

To face these challenges we need to advance work on agricultural sciences. The way to improve yield in general is to close the yield gap between experimental yield and average farm yield. When the actual yield is about 80 percent of the experimental yield, there is only a small gap to improve. It is hard to further increase the average yield. In most rice producing parts of the world, the average farm yield is almost 80 percent of the experimental yield. The yields of wheat and maize in the developed high-income countries like U.S. and Europe is relatively high, the gap again is only about 20 percent. Under this situation, the CGIAR has a mission to push the experimental yield further higher in experimental fields employing new scientific tools and methodologies.

We know agricultural production requires land and water. Water is another important issue. In the developing countries, agricultural production has already taken about 85 percent of the total available water. But only about 40 percent of global crop production is from irrigated lands. In many parts of the world, the extraction of water reduced groundwater level and water resources have become unsustainable. Also with increasing industrialization, water pollution has become another challenge. So, in the future, I think agricultural research will be somewhat different and more difficult from the agricultural research in the past. Because most of the research was carried out on fertile lands and

with enough irrigation water, in the future, much of agricultural research is expected to work on marginal land, and so the research agenda will be more challenging and more expensive.

**New Challenges:** We also face new challenges related to the global warming and climate change which are likely to affect agriculture demand and supply simultaneously.

From the demand side, we know that this year, one of the important reasons why the grain prices doubled or tripled, is related to biofuel, because of increasing concern about the global warming, and energy security. Some of the developed high-income countries have mandated subsidies to the production of the ethanol and biofuel. Ethanol could be produced from several crops: maize, cassava, sugarcane. And biofuel production is competing with grain production for land, for water, and it can cause deforestation, and certainly it also directly competes with food. The use of maize for ethanol production just a few years ago was negligible. Last year, 25 percent of the maize in the world was used for ethanol production. And because of that, the maize price increased first. Wheat prices were linked to the production of corn, and wheat price also increased. Also rice price increased accordingly. Some financial investors saw in these increases an opportunity and started to speculate on grain prices, and pushed the demand further upward. Farmers also saw the price increase as an opportunity, and participated in the holding of stocks. This practice is an important reason why grain prices increased significantly in recent months. Because of this speculation, the trading system collapsed and caused the grain prices to fluctuate.

The technology of ethanol production is not mature yet. Because of strong government subsidies and mandate, the use of grain to produce ethanol is not competitive. It relies heavily on government intervention. Government policy can change which would cause additional uncertainty on the demand side, and uncertainty is neither good for farmers nor consumers. If the government changes biofuel policy, it may cause the grain market to collapse. Farmers who produce grain can be seriously hurt.

The climate changes also affect food supply. If we try to control carbon emission at current level, and according to climate change models, it is likely that world temperature would increase by about 2 to 3 degrees which will affect rainfall patterns,- both quantity and frequency and would cause extreme and unpredictable weather conditions .

Some models predict that climate change would cause crops yields in the temperate zone to increase. In the tropical zone, the yield is likely to decrease. But the total impact is uncertain.

There is also the distributional impact because most poor farmers live and cultivate in the tropics. The global warming may not be restricted to only 2 to 3 degrees. The emission of CO<sub>2</sub> can be higher because of increasing industrialization, and this is a main cause of concern for future stability of food production.

### **New Directions for the CGIAR System**

Both, the conventional challenges and new challenges, require that we have a "reflection" on the direction of the CGIAR. I read the report about the independent evaluation commission, and I read the documents about proposals for change management. I fully agree and endorse those recommendations. We need to have well-defined research programs, and a focus on areas where yield gap has not been narrowed, and to focus on areas where poverty and malnutrition are serious. The priority for the CGIAR should be to maintain its historical achievement of excellence. Because of the new challenges I mentioned above, the CGIAR System needs to acquire new skills and also resources in order to deal with the new complexities that a CGIAR system should be addressing: new technologies, higher yield levels, climate change, and also political economy issues. The new structure of the CGIAR System should allow the Centers to work within a flexible and a responsive management organization. The centers should be able to change their research programs, according to their needs, and to be competitive and not burdened by the bureaucracy of the new System structure. The organization networks certainly should support the Centers, and the Center structure of the new CGIAR system should remain simple and transparent and well focused on scientific programs, because scientific programs are the glue which calibrates the parts of the CGIAR system--that is, the Centers we have now.

Because agriculture technology is location-specific, the CGIAR System and the Centers should work with the national agriculture research systems in a new globalized world, to deal with local challenges.

### **The CGIAR in Africa**

Since we are meeting in Maputo, I would urge the CGIAR to consider Africa as the priority for CGIAR future focus. As I mentioned earlier, the reorientation of the resources and location should be targeting areas where the yield gap has not been narrowed, areas where poverty and malnutrition are big issues, and Africa is where these issues are salient.

I'd like to say a few words about how CGIAR can help African agriculture. In the past five years, GDP growth rate in several countries in Africa, on the average, was 3 percent, but more important, the GDP of agricultural population population-increased less than 1 percent per year. That is well below other parts of the world, especially when compared with East Asia, where the GDP of the farm population increased by about 3.1 percent. Since agriculture is the main source of income of the poor people, improving agriculture is the key for poverty reduction in Africa and indeed in many part of the world.

A quick look at the statistics in Africa in the past 25 years, we notice that not much has improved in the life of the poor, especially when we look at the percentage of people who live under the international poverty line. Recently, the World Bank reports confirmed that in the 1980s, 50 percent of the population in Africa lived under \$1.25 a day. It remains the same at 50 percent in 2005.

How can CGIAR help? Certainly, this is an issue that has been discussed and debated. There are two strategies: One is to allocate the resources to improving traditional crops in less favorable areas, and the other strategy is to allocate available resources to commodity crops in favorable regions. The answer to this debate in the past seemed to be clear-cut. Resources should be allocated to the commercial crops in the favorable regions. Farmers' income will increase, and the demand for grain can be satisfied by international trade or regional trade. As the demand for grain increases, farmers who produce grain will benefit from the price increase.

I adopted this argument sometime ago. I have written a paper published in one of the leading journals supporting this point. With the large price fluctuation this year, we may have to revisit this principle. Food security, is a real issue. Without food security, there is no social stability nor political stability. We need a balanced approach between growth of commercial agriculture and achieving food security. With the help of IFPRI and other researchers, we could design a better international grain trade system, and that is an economic principle that can be applied. If this economic principle can be applied, how can CGIAR help the agriculture in Africa to work on the commercial crops?

Commercial crops, compared to the grain crops, have a special system which promotes technological change such as the "processing industries" and the supermarket chain. These chains allocate resources to achieve high productivity of cash crops. If the CGIAR decides to work on commercial crops, the system needs to work closely with the private sectors and to find a format to agree on the division of labor. It is also important to work with the diversified National Agricultural Research System in Africa. This system includes small and not so large national programs. There are also some regional centers of excellence in Africa. The CGIAR System needs to constantly explore the opportunity to work with the regional centers of excellence and National Agricultural Research System in Africa.

If the CGIAR is to effectively help the African agriculture, it should consider technology is just one dimension. The experiences of successful countries, like the country I come from, China, or our neighboring country, India, or even countries in Africa like Ghana provide useful lessons for the CGIAR in Africa.

Latest statistics confirm that China has done remarkably well in terms of poverty reduction. According to the World Bank new research, in 1980s, 82 percent of the population in China lived below \$1.25 a day, below the international poverty line, By 2005, the proportion of people who lived under this poverty-was-reduced to 16 percent. In India, in 1980, 60 percent of population lived below the poverty line. By 2005, the ratio was reduced to 40 percent - a remarkable achievement.

In Ghana, equally remarkable achievements have been made in reducing poverty through agricultural growth. According to World Bank studies, 52 percent of the population in Ghana lived below the international poverty line in 1992. This proportion was reduced to 28 percent by 2005.

There are many lessons for African agriculture to learn from these successful

experiences. Because of time constraint, I'm not going to elaborate on the individual country experiences. There are common denominators in their success.

The first is certainly related to agriculture research. China has established successful records in bringing the Green Revolution to their culture. In 1960s, China started to introduce new high yielding varieties. In 1970s, China promoted hybrid rice varieties. India, started in 1960s to promote high yielding dwarf varieties. China and India were able to advance the Green Revolution because they invested in building extensive national agricultural research system. Both countries are continental type with vast geographical areas with several ecological zones and diversified production systems. They have their national research centers, they have their provincial centers, they have county centers to engage in location-specific research to test varieties, and also to provide extension services to farming communities.

In Ghana, with limited government involvement, the cocoa production improved significantly. Cocoa-is the main cash crops. Producers' cooperatives and the market were heavily involved. They played an important role in promoting new varieties, new seeds, and fertilizers. Research is one area that the African countries need to now emphasize. To introduce agriculture research and extension, it's also important to improve the infrastructures. For the high potential agricultural area, irrigation water is available, but also needed is efficient water management. There is a need for irrigation. And for the marginal land, as the experience of India and China confirm, irrigation becomes even more important. There is the need to improve watershed management China and India, and Ghana have done well with their strategies to promote agricultural growth.

During my recent visits to several countries in Africa, I noticed that irrigation is one area that lags far behind. Agricultural production is a socioeconomic system. There is the need to provide incentive to the farmer: When they work hard, they should get more for their hard work. An example is China's change from the collective system to individual household farming system. Through this change, farmers' incentive improved and productivity in China jumped 20 percent over a short period of time.

Also important is to guarantee the right price that provides incentive, so farmers can recover their cost. Governments should not tax agriculture as a way to cover public expenditure.

Also needed is efficient marketing system. Farmers, in China, in India, or in Africa, are all the same. They want to improve their livelihood. They work so hard. This morning, I went to see the farmers around Maputo. They work so hard, even though the sun was very hot. They need to be able to deliver their product to the market; otherwise they won't get the return. There is the urgent need to improve the marketing system, improve the low accessibilities, and with the new technology. They need to have new inputs including fertilizer, and water extension services. Farmer should have access to modern inputs to grow the modern varieties. Farmers need to purchase inputs including seeds. They need credit to allow them to purchase these inputs. I am confident that when these dimensions are attended, farmers in Africa will be able to improve their life and certainly produce

enough grain, enough agricultural products to feed themselves, even to feed the poor.

### **The CGIAR and Stable Grain Markets**

And finally, let me say a few words about the grain price fluctuation and how to cope with this issue. I mentioned earlier, whether we can rely on economic principles to allocate our resources in research depends on whether we have the ability to improve the efficiency of the global grain trading system. Each country can rely on increased income to purchase grain to achieve its goal for food security.

Without an efficient global trading system, countries will go back to the old system by trying to be grain self-sufficient, and that system is inefficient. Under such arrangements, countries cannot utilize their comparative advantages to improve their resource allocation.

We need to understand why the price fluctuates so much this year. The analytical work by IFPRI is remarkable. I learned a lot from them, but certainly I'd also like to have some input myself.

We know food security, is important politically-and more so humanitarily. It is important to make sure that all the population has enough food because it is both a political issue and economic issue.

Agricultural production has some unique features. It is location-specific and weather-related. Agricultural production has some variants, some good years and some bad years. The larger the cultivated areas, the smaller the variations I did some studies and found that in the past 40 years, from 1960 to 2005, the variants, globally, compared to the trend, was 2.7 percent: a large country like China, 4.6 percent; in a smaller country like Philippines, 6.2 percent. The research confirms that the smaller the area, the larger the variants.

If each country wanted to maintain the grain self-sufficiency, it needs to have a large grain reserve in order to cope with the variants. Grain reserve stock is costly to maintain. There are several costs, the grain will deteriorate if stored for some time, infestation and damage is in addition to the carrying cost like interest rate and so on. Globally, the variance is small. To have an efficient global trading system, each country can reduce the grain reserve. In a bumper year, participating countries can sell in the global market. When they have deficit, they can buy from the global market. And with that, they can switch their production to a crop for which they have comparative advantages. Each household can do that, each area can do that, and each country can do that. And that will be a win-win situation for the world. That was the argument that has been applied in the last ten years. Many governments have followed these policies.

In 1999 and 2000, the global stock of grain was 31.2 percent of the global production. Because countries relied on international trade, the grain stock was reduced by half to about 16.5 percent by this year crop season. Most of those stocks, were commercial

carrying stocks. This arrangement seems efficient. The trouble is that the world encountered a biofuel shock which I discussed earlier including distorted government mandate and subsidies. The demands for maize increased substantially, causing the maize price to increase, and then wheat price increased. When price increased, financial investors treated grain as some kind of asset category and started to speculate, and the price surged. Farmers also followed this speculation by holding their stock. The governments in many parts of the world were caught unprepared because they didn't have any grain stock to stabilize the grain prices. That was main reason why we had the doubled and triple increase in grain prices. If one percent global output of rice or wheat is maintained as a reserve stock, the grain prices would stabilize. Governments in most countries didn't have any grain reserve to release.

A few countries had the grain reserve, but for political economy reasons, they only considered themselves. They don't want to release the grain to the international market, the reason why the whole global system collapsed.

And I fully agree with IFPRI's recommendation to have a virtual stock. When those speculators speculate, future contracts in a large amount can be stored to decrease the price and reduce the incentive to the speculators. I would also like to suggest that a shield, international stock be established. Participating countries should maintain a certain amount of grain, and agree that, when the price increases to a certain level, and according to certain formula, they release some part of the grain stock to stabilize prices. Exporter countries should also agree not to impose any kind of trade barriers. In a way the grain markets should stabilize which would restore confidence in the global grain markets. When this system is in place, the CGIAR can apply economic rationality in guiding the principle of resource allocation in the farm level, in the national level, and also to guide our researchers.

## **Conclusion**

Let me conclude. It's quite an honor for me to have the opportunity to come back to CGIAR system. And Kathy already mentioned, the World Bank is committed to make our contribution, because the mandate of the World Bank is poverty reduction, and poor people live on agriculture. So, the World Bank will double our effort to support agriculture, to support the CG system, and I look forward to our joint work in the future to make the contribution.

Thank you.