THE ECONOMICS OF FOOD

The subject for this evening is food and specifically the role that economics plays in determining who eats well and who goes hungry.

Before we start to consider that question, I would like to quote from the Taittiriya Upanishad an ancient Eastern philosophical text. This Upanishad says, "All that is born is born of food. Whatever exists on earth is born of food, lives on food, and in the end merges into food. Food indeed is the first born amongst all beings."

Well, if nothing else that underlines the importance of food. All of us here tonight are basically food in human form. Without food we would never have come into existence and if we have no access to food we cannot continue to live. To have access to food we either have to produce it ourselves or obtain it from others who do produce it. To obtain food from those who do produce it, the most common way is by paying them with money. Access to money for most of us is through earning an income. Our ability to earn an income and the size of that income is very much dependent on the kind of economy we are living in.

So economics does have a key role in determining whether we eat and what we eat. In 1990, world leaders met and adopted the United Nations Millennium Declaration. One of the goals they set was to halve the proportion of hungry people by 2015. The good news is that that goal was achieved and 216 million people have been rescued from a life of hunger. The bad news is that there are still nearly 800 million people in the world who are under-nourished.

Back in 2005, on a single day, July 16, the American and British economies delivered nine million copies of the sixth volume of the Harry Potter children's book series to eager fans. Book retailers continually restocked the shelves as customers snatched up the book. Amazon shipped pre-ordered copies direct to customers' houses. There was no Marshall Plan for Harry Potter, no International Finance Facility for books about under-age wizards. It is heart breaking that global society has evolved a highly efficient way to get entertainment to rich adults and children, but it can't provide food for many other adults and children who go hungry even though there is more than enough food to go round.

So where to start? The prime cause of malnutrition is poverty; apart from the consequences of natural disasters, such as drought or floods, it is people not being able to afford adequate food supplies that is the most common cause of hunger. Poverty can be found all over the globe, in rich societies as well as underdeveloped countries. So if we are to discover why so many people go without adequate food we need to find out what causes of poverty. The reasons for poverty will vary from country to country but there are four common features which some economists have called development traps and which are particularly relevant for the poorest communities of the world which are sometimes referred to as the 'bottom billion'. They are

- Conflict, especially civil war
- The resources curse
- Being landlocked with poor neighbours

- Bad governance

I will only briefly enlarge on these headings since they take us away from the theme of food. I will then return to the subject of food and consider the challenge for the future and whether the ways in which the world currently addresses the problem of feeding the poor is sustainable in the medium and long term.

Conflict
There is conflict in most societies but political conflicts in most countries do not spill over into violence. This is not so in many poor countries where there is often a pattern of violent internal challenges to government. Sometimes the violence is prolonged, a civil war, sometimes, as with coups d'etat it is over swiftly. But both two forms of political conflict are costly and can be repetitive. Nearly ¾ of the people living in the societies of the 'bottom billion' have recently been through a civil war or are still in one.

The Resource Curse
About 30% of the people in the bottom billion live in countries in which resource wealth, such as oil or other minerals, dominates the economy. Why should resource wealth be a problem? One of the reasons is that resource wealth can make democracy malfunction. Or to put it more bluntly, a small elite become rich and the benefits do not get transferred to the rest of the population. Restraints on political power have not been developed in these poorer countries in the same way that checks and balances have in countries with a longer history of democracy.

Bad Governance
Although bad governance, corruption and bad policies can ruin the most promising prospects, as in Zimbabwe, they need not be disastrous. But they do play a part in explaining poverty in many countries.

Landlocked with poor neighbours
This trap can be best described by contrasting Switzerland and Uganda. Why is Uganda poor when Switzerland is rich? Partly it is because Switzerland's access to the sea is through German and Italian infrastructure, whereas Uganda's access to the sea depends upon Kenyan infrastructure. Which do you think is better? If you are landlocked with poor transport links to the coast that are beyond your control, it is very difficult to get to the global markets for any product that requires a lot of transport. So forget manufacturing which historically has been the most rapid driver of development.

But landlocked countries also tend to depend upon neighbours as markets. To a large extent Switzerland is surrounded by its market. But some markets are better than others. Switzerland has France, Germany, Italy and Austria. Uganda has Kenya which for a long time had a stagnant economy, South Sudan which is embroiled in civil war, Ruanda which had a genocide, Somalia which has been riven by civil war and the Democratic State of Congo, which has long been a failed state.
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The Challenge for the Future

The current population of the world is around 7 billion people. It is forecast to increase to between 9 and 10 billion people by 2050 and level off thereafter. So we will have to feed another 2-3 billion people over the next 35 years. How on earth are we going to do it? At present the global economic architecture used for meeting people's needs and desires is what is known as globalization. It is a word which is bandied about quite freely. But what exactly is globalization? There is no shortage of definitions but most of them reflect the bias of the author for or against globalization. One objective one I came across is this one from Joseph Stiglitz, who was Chief Economist at the World Bank until 2000. Here it is;

Fundamentally, it is the closer integration of the countries and peoples of the world which has been brought about by the enormous reduction of costs of transportation and communication, and the breaking down of artificial barriers to the flow of goods, services, capital, knowledge and (to a lesser extent) people across borders. Globalization is powerfully driven by international corporations, which move not only goods and capital across borders but also technology.

Now that definition may be objective but it is not very exciting. For something a bit more red-blooded, I can offer you this from the American economic journalist, Thomas Friedman;

The driving force behind globalization is free market capitalism – the more you let market forces rule and the more you open your economy to free trade and competition, the more efficient and flourishing your economy will be. Globalization is spreading to virtually every country in the world…has its own set of rules requiring opening, deregulating and privatizing… and its own dominant culture which is homogenizing and spreading Americanization – from big Macs to iMacs to Mickey Mouse – on a global scale…it is an electronic herd trampling through the markets at will, a 'golden straitjacket of strict but supposedly beneficial Free Market policies and a brutal in-your-face capitalism which leaves laggards as roadkill on the global investment highway'.

And Friedman is a fan!

Opinions about the benefits of globalization are divided. A majority of voters in America have basically just given it the thumbs down. And yet it has brought about much which has been good. Opening up to international trade has helped many countries to grow far more quickly than they otherwise would have done. International trade helps economic development when a country's exports drive its economic growth. Since the second world war, export-led growth was the centrepiece of the industrial policies that enriched much of Asia and left millions of people better off. Because of globalization many people now live longer than before and their standard of living is far better. Some people in the West may regard low-paying jobs making sportswear for Nike as exploitation, but for many people in the developing world, working in a factory is considered a far better option than staying on the farm and growing rice.

So those who vilify globalization too often overlook or play down its benefits. But the proponents of globalization have been, if anything more unbalanced. To them, globalization is progress; developing countries must accept it if they are to grow and fight poverty effectively. But to many in the developing world, globalization has not brought the promised economic benefits. There has been a growing divide between the haves and the have-nots which has left substantial numbers in dire poverty. There are also growing concerns over whether it is sustainable and it is the question of sustainability that I would like to turn to next.

Before I do so though, I must mention what was known as the Green Revolution.

Green Revolution

This refers to a set of research and development initiatives occurring between the 1930s and the late 1960s that increased agricultural production worldwide, particularly in the developing world, beginning most markedly in the late 1960s. The initiatives resulted in the adoption of new technologies and were led by a man called Norman Borlaug, who received the Nobel Peace Prize for this work in 1970. The initiatives are credited with saving over a billion people from starvation. They involved the development of high-yielding varieties of cereal grains, expansion of irrigation infrastructure, modernization of management techniques, distribution of hybridized seeds, synthetic fertilizers, and pesticides to farmers.

Despite this success in feeding large numbers of people, the Green Revolution has been criticised on a number of grounds, including its social impact, its environmental impact, the trend to monoculture and its reliance on chemicals for such things as fertilizer and pest-control. All these put into question its sustainability.

Before proceeding, it is worth hearing what Norman Borlaug had to say about some of these criticisms. Of environmental lobbyists, he said*:*

"some of the environmental lobbyists of the Western nations are the salt of the earth, but many of them are elitists. They've never experienced the physical sensation of hunger. They do their lobbying from comfortable office suites in Washington or Brussels...If they lived just one month amid the misery of the developing world, as I have for fifty years, they'd be crying out for tractors and fertilizer and irrigation canals and be outraged that fashionable elitists back home were trying to deny them these things".

There are two main views as to how we will feed the world over the next thirty years. At present in spite of the presence of large multinational agribusinesses practising industrial farming, 70% of the world's food is grown by small farmers. One view is that these peasant farmers are merely survivors of a doomed way of life who need to be helped into other activities. Observing both that wages in cities are higher than in the countryside, and that every large developed country is able to feed itself without peasant farmers, they argue the virtues of big agriculture. Big agriculture of course tends to work most lucratively with large-scale plantations and operations to which small farmers are little more than an impediment.

But, according to the World Bank, if you're keen to make the world's poorest people better off, it's smarter to invest in their farms and workplaces than to send them packing to the cities. In its 2008 World Development Report, the Bank found that investment in peasants was among the most efficient and effective ways of raising people out of poverty and hunger. It was an awkward admission, as the Bank had long been trumpeting the virtues of big agriculture.

Farmers organizations from Malawi to India to Brazil had been pointing out that access to land, water, sustainable technology, education, markets, state investment in processing, and — above all, access to a level playing field on domestic and international markets — would help them. But it took three decades of faulty policy for the development establishment to begin to realize this.

Taking this as the starting point for considering the future challenge, I would like now to look at the first two items on that list; access to land and water. There are two important aspects to land, there is land as part of the dry surface of the Earth and there is the soil on the surface of that land. Let's look at land first and we will start by meeting a man called Omot Ochan.

Omot Ochan is sitting in a remnant of forest in Ethiopia on an old waterbuck skin eating maize from a calabash gourd. He is lean and tall, wearing only a pair of combat trousers. Behind him is a straw hut, where women and barefoot children are busy cooking fish on an open fire. A little way off are other huts, the remains of what was once a sizeable village. Omot and his family are from the Anuak tribe. They had lived in the forest for ten generations. He tells the environmental consultant and one-time journalist, Fred Pearce, '*This land belonged to our father. All around here is ours. For two days walk.'* He describes the distant tree that marked the boundary with the next village. He goes on, '*When my father died, he said don't leave the land. We made a promise. We can't give it to the foreigners.'*

The conversation with Pearce is punctuated by the rumble of trucks passing on a dirt road just 20 metres away. The dust clouds they created waft into the clearing and rain down on the leaves of the trees. Beyond the road, huge earth-diggers are excavating a canal. Omot watches them. He says, '*Two years ago, the company began chopping down the forest and the bees went away. We used to sell honey. We used to hunt with dogs too. But after the foreigners came, the animals here disappeared. Now we have only fish to sell'.* And with the company draining the wetland, the fish will probably be gone soon, too.

Omot lives in Gambella which is the poorest province of one of the world's poorest nations – a lowland appendix in the far south-western corner of Ethiopia. Geographically and ethnically, the hot, swampy province feels like part of the new neighbouring state of South Sudan, rather than the cool highlands of much of the rest of Ethiopia.

Only three flights a week go to the provincial capital, also called Gambella. When you get there, there are no taxis, because there is no demand. The road from the airport is a dirt track through an empty landscape. Gambella town is a shambles. Its population of 30,000 has no waste collection system, so garbage piles up. The drains

don't work, public water supplies are sporadic and electricity is occasional. The couple of paved roads are heavily pot-holed and give out before the town limits.

Of late, the central government in Addis Ababa has stopped pretending that the province of Gambella doesn't exist. It now seems intent on taming the local population. In practice, that means bringing in foreign agribusinesses and collecting the province's dispersed population in state-designated villages, while their forests, fields and hunting grounds are handed over to outsiders. In the service of capitalism, or the current version thereof, the Gambella 'villagisation' programme will relocate a domestic population much like Stalin, Mao and Pol Pot did.

The landgrabber in this case is Sheikh Mohammed Hussein Ali Al Amoudi, a Saudi oil billionaire with large holdings in Ethiopian plantations, mines and real estate. In 2011, *Fortune* magazine put his personal wealth at more than $12 billion. Ethiopian born, he is often described as the world's richest black man. He is a million dollar donor to the Clinton Foundation, and was also a close confidant of Ethiopia's former prime minister, Meles Zenawi, and his ruling party which had granted a 60-year concession on 10,000 hectares of Gambella to Al Amoudi's company, Saudi Star. (10,000 ha is equivalent to 24,000 acres of Cambridgeshire.

Al Amoudi has been eyeing agriculture since the world food price spike in 2008 sent Saudi Arabia into a spin about its future food supplies. He is intent on shipping most of his intended produce, including in excess of a million tons of rice a year, to Saudi Arabia. There he has been feted by the king for making investments abroad to keep the kingdom fed. To smooth the wheels of commerce, Al Amoudi has recruited one of Zenawi's former ministers as chief executive of Saudi Star.

Saudi Star's concession is based around Alwero Dam, built in the 1980s to irrigate a state cotton farm that never happened. Al Amoudi is digging a 30-kilometre canal from the dam to irrigate rice paddies. Once the old state farm is watered, he wants to expand to at least 250,000 ha, to grow sunflowers and maize. (an area about twice the size of Hertfordshire). Omot insisted that Saudi Star had no right to be in his forest. The company had not even told the villagers that it was going to dig a canal across their land. Listening to Omot describing his ancestral connections to the patch of forest, and his determination to keep it, Pearce was struck by how most Westerners have lost their sense of place and attachment to the land. We tend to move around, buying and selling houses without feeling ties to the soil. But in Gambella, their land is like their blood. It is everything. And to lose it is to lose their identity.

Ethiopia is not an isolated example of what has been called 'landgrabbing'. 203 million total hectares of land (over three times the size of France) were acquired in the developing world by international investors from 2000 to 2011.

Soil

Beneath our feet, out of sight and out of mind, soil is probably the least appreciated source of human welfare and society. More than simply a prerequisite for farming and food production, it is a profoundly complex web of interactions that enables so many of the earth's life support systems to function. The make-up of soil is hugely diverse. Its essential components are weathered rock, once living things that are

now dead, living things that are still alive, gases and water. A very approximate breakdown of the proportions of these would be rock at about 45%, air 25%, water 25% and organic material 5%. These proportions vary greatly, with, for example, peaty soils comprising mainly organic matter.

The organic material in soil contains the carbon-based molecules that are the energy source that fuels the most important component – the living part. And when it comes to the complement of animals, plants and microbes living and interacting below ground, the statistics get quite dizzying. For example, it is estimated that a tablespoonful of earth of healthy soil from an arable landscape is home to more bacteria than there are people on earth.

Irrespective of their complexity, soils obviously deliver some fundamental benefits to mankind. Over 90% of our food depends on functioning soil for its continued production. No matter how much processing, packaging and marketing goes into modern food, the production of most of it depends in the end on a vast army of nematodes, microbes and worms. The next time you pick up a packet of peas or crisps, remember who the ultimate producers of those products were – its not Birds Eye or Walkers!

Farming is one of the factors that can put significant stress on soil systems. Globally, and since the mid-twentieth century, about a third of all farm soils have become degraded to some degree. In parts of the United States soil is being lost ten times faster than it is being replenished; in parts of China and India it is estimated that soil losses exceed soil formation rates by a factor of forty. It is estimated that about 1 billion people today live in regions experiencing land degradation and declining productivity. Much of the worst damage is in China, Africa south of the equator and parts of South East Asia. In other words places undergoing the fastest increases in population.

During recent decades, and at the global level, the loss of farmland through erosion has been compensated for through intensive farming methods and also opening up new areas to cultivation. Many of these new areas of cultivation were at the expense of tropical rainforests. Some 24% of the global land surface is now cultivated. Another quarter is managed as pasture. Many of those areas where cultivation is absent are too dry, too cold or too mountainous. Opening up more of this cultivated land and pasture has of course been at the expense of natural habitats. During the past two centuries or so, we humans have converted about 70% of the planet's grasslands, about half of the savannah biome and nearly half of the deciduous forests. While there is still scope for expansion into new virgin land to increase the area of soil available for food production, environmentalists assert that there are important reasons why those wilder areas should remain as they are. As a result of an increasingly clear squeeze between supply of fertile soil and demand for the products which need that soil to grow, soil loss has become a key global issue.

Water

In the developed world we take water for granted. Most of us would be hard-pressed to say how much water it takes to get us through the day. On average we drink no more than 5 litres per day. But once we add in the amount used for washing and flushing the toilet, this rises to around 150 litres per day. In some countries, suburban lawn sprinklers, swimming pools and sundry outdoor uses can double that figure.

We can all save water in the home. But whilst it may be laudable to have a shower rather than a bath, or to turn off the water while we are brushing our teeth, regular domestic water use is not what is really emptying the world's rivers. Manufacturing the goods that we fill our homes with consumes a certain amount, but that's not the real story either. It's only when we add in the water needed to grow the food we eat and drink that the numbers really begin to soar.

The numbers are mind-boggling;

- It takes between 2,000 and 5,000 litres of water to grow 1 kilo of rice i.e. more than many households use in a week.
- It takes 1,000 litres to grow a kilo of wheat

When you start feeding grain to livestock for animal products such as milk and meat, the numbers become even more startling.

- It takes 11,000 litres to grow enough cow to make a quarter-pound beefburger
- It takes between 2,000 and 4,000 litres for that cow to fill its udders with a litre of milk.
- It takes about 5,000 litres for a kilo of Cheddar or Brie or Camembert.

And if you think that your shopping basket is getting a little bulky at this point, maybe you should leave that kilo of sugar on the shelf. It took up to 3,000 litres to produce. And the kilo jar of coffee tips the scale at 20,000 litres – or 20 tonnes - of water.

Converting those statistics into meal portions you come up with the following;

- More than 100 litres for a portion of rice
- 150 litres for the bread in a sandwich or slice of toast
- 500 litres for a two-egg omelette or a mixed salad
- 1,500 litres for an ice cream
- 2,000 litres for a pork chop
- 5,000 litres for a small steak

And if you have sweet a tooth, so much the worse; every teaspoonful of sugar in your coffee requires about 50 cups of water to grow it. Which is a lot, but not as much as the 1,400 cups of water needed to grow the coffee itself. Prefer alcohol? A glass of wine or pint of beer with dinner requires about 250 litres, and a glass of brandy afterwards takes a staggering 2,000 litres.

A typical meat-eating, beer-swilling, milk-guzzling Westerner probably consumes as much as 100 times their own weight in water every day. A vegetarian could probably get by with half that amount. Time, surely, to go out and preach the gospel of water conservation. But don't buy one of those T-shirts with slogans like 'Save water, bath with a friend'. Good message, but you could fill roughly 25 bath-tubs with the water needed to grow the 250 grams of cotton needed to make the T-shirt.

Around forty years ago, the world was gripped by nightmares of mass starvation. The world's population was set to double in a generation. Billions it was said would die of starvation. But this didn't happen. The world's population has indeed doubled, but scientists defied the doomsayers by developing new high-yielding varieties of rice, wheat and maize that kept the granaries full. Averaged globally, the 'green revolution has ever since kept growth in food production ahead of the growth in population.

It is an impressive achievement. But those new high-yielding crop varieties needed water, huge amounts of it. So the world embarked on a vast investment programme, first in dams and then in irrigation canals to deliver that water to fields. The financial cost has been huge, but, today, poor developing countries like India, China and Pakistan have three-quarters of all the world's irrigated farmland. And many of them have defied the doomsayers by moving from famine to self-sufficiency in their staple grains.

The problem now is escalating water shortages. Today some 70% of all the water abstracted from rivers and underground reserves is being spread onto the 270 million hectares of irrigated land that grows a third of the world's food. While the new crops are indeed very 'efficient' at delivering more crop per acre (or hectare), they are often extremely inefficient when measured against water use. They have often produced less 'crop per drop' than the varieties they replaced. The world grows twice as much food as it did a generation ago, but it abstracts three times more water from rivers and underground aquifers in order to do so. In the green revolution countries, water consumption per head is several times that of European countries. Pakistan abstracts five times more water per head than does Ireland; Egypt five times more than Britain; and Mexico five times more than Denmark. No wonder the rivers are emptying.

There are some disturbing trends. Egypt, for instance, has had to import growing amounts of food because there is not enough water to sustain the high-yielding varieties. And other countries are living on borrowed time; the water is running out. A quarter of India's crops are being grown using underground water that is not being replaced by the rains. In others, salt from the irrigation water is invading their fields and rendering large areas sterile and useless.

So are we once again facing potential disaster? It is perhaps dangerous to predict doom when it didn't happen last time. But if the pessimists are to be proved wrong then all or part of the following scenario has to come true;

1. Communities change their food consumption behaviour i.e. away from foods with a high virtual water footprint.

2. We need to waste less food; one third of all food produced is never consumed. Each year food that is produced but not eaten guzzles up a volume of water equivalent to the annual flow of Russia's Volga River.
3. The world's growth in population levels off in the second half of the 21st century
4. Economically sound policies can improve the productivity of water by ensuring that it is allocated to activities and crop production that brings high returns to water
5. Technology can significantly improve the productivity of water in food production

When the rivers run dry, based on experience in different parts of the world, any of the following can happen

The negative responses include

- The crops fail
- We mine our children's water
- The wet places die
- Peoples go to war over water
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The positive responses include

- We go looking for new water
- We try to catch the rain
- We become smarter in our use of water

Let's finish on a more positive note. The following is from a piece in a recent issue of the Guardian by their special correspondent on food politics, Felicity Lawrence;

The latest frontier is Africa, where there is a scramble to spread the agro-industrial model of farming. But it may well be in Africa, that a different, more ecological vision of the food future emerges. I had a glimmer of it on a trip to a horticultural export company based on Kenya's Lake Naivasha.

The company, Flamingo Homegrown has abandoned its long and heavy use of chemical pesticides, partly in a response to a campaign highlighting their effect on workers' health, but partly in recognition that they were on a losing treadmill of spraying and pest resistance.

They have reinvented their agriculture in a way that makes the science of agrochemical use look primitive. Instead they employ groups of highly trained African scientists to study and reproduce in labs the fungi and microrrhizae in healthy soil that form intricate links with plant roots. Rather than waging chemical war on land, they are working to harness its immensely complex ecosystems. They have built vast greenhouses dedicated to breeding and harvesting ladybirds to control pests biologically rather than chemically.

There is another route to food security and it is the polar opposite of three agrochemical giants bestriding the world.

Sources; The Landgrabbers; Fred Pearce
When the Rivers Run Dry; Fred Pearce
What Has Nature Ever Done For Us?; Tony Juniper
The Bottom Billion; Paul Collier