Agriculture, growth and poverty reduction

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Executive Summary

History shows that different rates of poverty reduction over the past 40 years have been closely related to differences in agricultural performance – particularly the rate of growth of agricultural productivity.

In Asia, the rapid productivity gains of the Green Revolution increased producers' incomes, raised labourers' wages and lowered the price of food. In addition, new livelihood opportunities were generated when success in agriculture provided the basis for economic diversification. However, despite decades of investment in new agricultural technology and rural development, hunger and poverty continue to plague large areas of the developing world. The problem is particularly acute in sub-Saharan Africa, where progress towards the Millennium Development Goals is slowest.

While increasing agricultural productivity perhaps remains the single most important determinant of economic growth and poverty reduction, serious doubts are emerging as to whether agricultural productivity can be further increased, where it is most needed, and what part, if any, small-scale farming will play in the future. Development experts need greater understanding of the links between agricultural productivity and poverty. They also need to assess just how far they have changed and the extent to which small-scale agriculture can remain a ladder out of poverty for millions of poor people living in rural areas.

Links between agriculture and poverty reduction are forged through four 'transmission mechanisms':

- direct and relatively immediate impact of improved agricultural performance on rural incomes;
- impact of cheaper food for both urban and rural poor;
- agriculture's contribution to growth and the generation of economic opportunity in the non-farm sector; and
- agriculture's fundamental role in stimulating and sustaining economic transition, as countries (and poor people's livelihoods) shift away from being primarily agricultural towards a broader base of manufacturing and services.

However, the potential for future poverty reduction through these transmission mechanisms depends on the extent to which agricultural productivity can be increased where it is most needed or, more simply and directly, the extent to which the Green Revolution can be replicated in Africa. Whether and how this might be achieved has been the subject of protracted debate amongst researchers and policy makers. The main questions in this debate are:

- Where to focus development efforts – high potential areas where development options are greater or poorer areas where the potential and options are less but the incidence of poverty is greatest?
- Who to focus on – the poorest smallholders who produce for subsistence and have limited engagement with markets, or larger-scale farmers whose success can be an engine of growth and generate wealth and jobs for rural households?

- What to do in less favoured areas – should agriculture be promoted amongst poor households in areas of low agricultural potential that are remote from markets and inputs supplies? Or should the focus be on employment generation to enable poor households to buy in food?
- What role for technology – should primacy in development efforts be given to yield-raising technology or to less intensive approaches that minimise variation?
- Which crops – should the emphasis be on crops that will be largely consumed within the households, or on income-generating cash crops?

Contrasting answers to these questions produce different policy positions. Those who are optimistic about the role of smallholders emphasise the need for increased direct investment in agriculture and rural development, with support focusing on creating institutions that will encourage and support smallholder-led agricultural development. They believe it is important to improve the productivity of staple food crops that are not traded internationally, but consumed by the poor and traded locally.

In contrast, smallholder pessimists emphasise the need to achieve the best outcome possible from rapidly changing global markets for agricultural produce. They believe that commercial production (probably on larger farms) of non-staple cash crops should be encouraged, particularly those that result in robust links to the non-farm sector where the main source of employment for the rural poor would be found. Influencing international policy processes to ensure access to developed country markets is a priority for this position, as is improving the human capital assets of the rural poor so they can take up opportunities in growth areas as they occur.

1. What is the issue?

Poverty has fallen rapidly over the past 40 years, but at different rates around the world. Asia has achieved the most rapid poverty reduction, particularly China, but also India and South East Asia. In contrast, little if any progress has been made in sub-Saharan Africa, where the number of people living on less than one dollar a day – the internationally agreed definition of absolute poverty – has doubled over the past 20 years (World Bank, 2004a).

Historically, rates of poverty reduction have been very closely related to agricultural performance – particularly to the rate of growth of agricultural productivity. In simple terms, this indicates that the countries that have increased their agricultural productivity the most have also achieved the greatest reductions in poverty.

In Asia rapid productivity gains, achieved largely through the technological advances of the Green Revolution, provided a 'fast-track' route out of poverty by directly increasing producers' incomes and labourers' wages, by lowering the price of food and by generating new livelihood opportunities as success in agriculture provided the basis for economic diversification.

However, despite decades of investment in new agricultural technology and rural development, hunger and poverty continue to plague large areas of the developing world.

The problem is particularly acute where people depend on rain-fed agriculture, in particular sub-Saharan Africa, where the impact of new technologies has been less apparent and agricultural productivity has generally stagnated and even fallen in some areas[1].

Achieving the Millennium Development Goal (MDG) of halving the proportion of people living in absolute poverty by 2015 will depend largely on increasing agricultural productivity, which remains perhaps the single most important determinant of economic growth and poverty reduction. This fact is not lost on developing countries or their development agency partners, who are seeking ways to stimulate agricultural development. But serious doubts are emerging as to whether agricultural productivity can be increased where it is needed most, and what part, if any, small-scale farming will play in the future. Underlying such doubts is a concern that the context in which small-scale agriculture could achieve productivity gains today is very different to that which prevailed in Asia during the halcyon days of the Green Revolution. Inherent differences in production capabilities and quite fundamental changes in the international agricultural context are combining to create a set of circumstances that are probably far less conducive to achieving the type of productivity transformation witnessed in Asia.

Development experts need greater understanding of the links between agricultural productivity and poverty. They also need to assess just how far they have changed and the extent to which small-scale agriculture can remain a ladder out of poverty for millions of poor people living in rural areas.

2. Agriculture, growth and poverty – what we know of the relationship

2.1 The context – the state of world poverty

Between 1981 and 2001, the percentage of the world's population living on less than a dollar a day fell from 40.4% to 21.1%. Even though world population grew by an estimated 1.5 billion over the same period, the numbers of people living in absolute poverty fell by almost 400 million to around 1.1 billion. These figures, while still presenting a picture of massive global poverty, represent probably the fastest rate of poverty reduction ever witnessed. However, the aggregate picture masks a story of variable progress (Table 1).

Table 1. Percentage and numbers of population living below the US$1 per day poverty line, 1981–2001

Region	% of population living below US$1 per day (1993 PPP)			Number of people living on less than US$1 per day (million)		
	1981	1990	2001	1981	1990	2001
East Asia and Pacific	57.7	29.6	14.9	795.6	472.2	271.3

[1] Nkamleu et al. (2003) calculate that, on average, total factor productivity in agriculture in 10 countries in sub-Saharan African decreased between 1972 and 1999 by 0.2% annually.

China	63.8	33.0	16.6	633.7	374.8	211.6
Europe and Central Asia	0.7	0.5	3.7	3.1	2.3	17.6
Latin America and Caribbean	9.7	11.3	9.5	35.6	49.3	49.8
Middle East and North Africa	5.1	2.3	2.4	9.1	5.5	7.1
South Asia	51.5	41.3	31.3	474.8	462.3	428.4
India	54.4	42.1	34.7	382.4	357.4	358.6
Sub-Saharan Africa	41.6	44.6	46.9	163.6	226.8	315.8
Global figure						
	40.4	27.9	21.1	1481.8	1218.5	1092.7

PPP = ??? Source: World Bank (2004a)

In terms of the proportion of people in absolute poverty, significant reductions occurred in most regions between 1981 and 2001. Progress was most rapid in East Asia, primarily China, where the proportion of the population living in absolute poverty decreased from almost 64% to just 16.6%. Elsewhere progress was steady, with the stark exception of sub-Saharan Africa where the percentage of the population living on less than US$1 a day has increased from 41% to almost 47%.

In terms of the numbers of people living in absolute poverty, the picture is very different. Almost the entire reduction in numbers between 1981 and 2001 can be attributed to progress in China, along with generally small and disappointing reductions in other parts of East Asia, India (where over 350 million people still live in absolute poverty) and the Middle East. But in sub-Saharan Africa, the number of people in absolute poverty has effectively doubled.

Almost all of these changes (both positive and negative) can be explained by a variable performance in tackling persistent rural poverty. Changes in rural poverty figures tend to closely track changes in national poverty figures, primarily because poverty in the developing world is a largely rural problem. As an illustration, the national poverty headcount in India decreased from 36% to 29% between 1994 and 2000, while rural poverty decreased from 37% to 30%.

Moving away from the broad geographical distribution of poverty described above, the characteristics of poverty remain remarkably consistent:

- poverty remains a predominantly rural problem: 75% of the world's poor live in rural areas (IFAD, 2001);
- poverty is concentrated amongst women, children and the elderly;

- poverty is most concentrated amongst vulnerable groups and castes, landless people[2] and ethnic minorities), who often live in remote rural areas. In Vietnam, for instance, the national poverty headcount fell from 58% to 29% during 1993–2002 for the whole country but remained at 68% in the northwestern hill areas, which are predominantly inhabited by ethnic minorities (World Bank, 2004).

As the next two sections of this paper will explore, differences in agricultural performance – particularly different experiences in increasing agricultural productivity – go far in explaining these major differences in reducing poverty.

2.2 Agriculture's recent performance – a picture of mixed progress

Total agricultural production has increased rapidly during the past 40 years. Statistics from the Food and Agriculture Organisation of the United Nations (FAO, 2004) indicate that between 1961 and 2001, global cereal production more than doubled (from 900 to 2,100 million tonnes), far outstripping the rate of growth of population. In the developing world as a whole, per capita food production rose by over 50% between 1961 and 2001 (IFPRI, 2002a). This has ensured that world food prices have declined progressively in real terms; Mitchell and Ingco (1993) report a 78% fall in food prices overall from 1950 to 1992.

Some of this increase reflects an expansion of the area under agriculture – particularly in Africa – but global yields have also increased over the same period, reflecting an increase in productivity through the introduction of new technologies and a major expansion of irrigation. (It is important to note the fundamental difference between increasing production and increasing productivity – see Box 1). The generally positive global picture masks large and quite fundamental regional variations. These are mapped out in Figures 1 and 2 and described below.

Box 1: Production and Productivity

To understand the sources of growth, it is important to distinguish between production and productivity.

Production is the same as output. It is physical produce and can be reported in units of volume or weight. For instance, cereal production would be reported in metric tonnes.

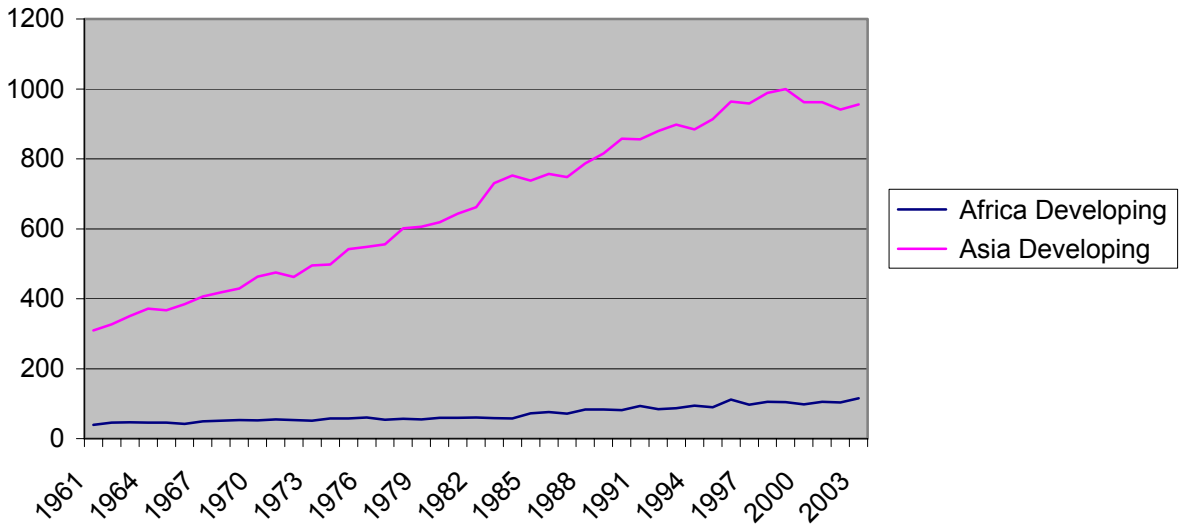
Productivity is not physical produce; it is a number. Productivity is defined as output per unit of input, where 'input' can be land, labour and/or capital, and 'output' is agricultural produce. The importance of productivity, however precisely defined, is that it gives a measure for efficiency. It tells us in one figure how much input was used to produce a unit of output. For instance, the labour productivity of paddy rice in 1998 in India is a number that tells us the amount of paddy rice that one Indian agricultural worker produced in 1998, on average. The unit of labour productivity is kilograms per worker.

It is important to specify what output (or outputs) and what input (or inputs) are actually used to calculate productivity. Labour productivity is the volume of output per unit

[2] Although recent research from India found that those with the smallest land holdings have lower incomes than the landless (Farrington and Deshingkar, 2004).

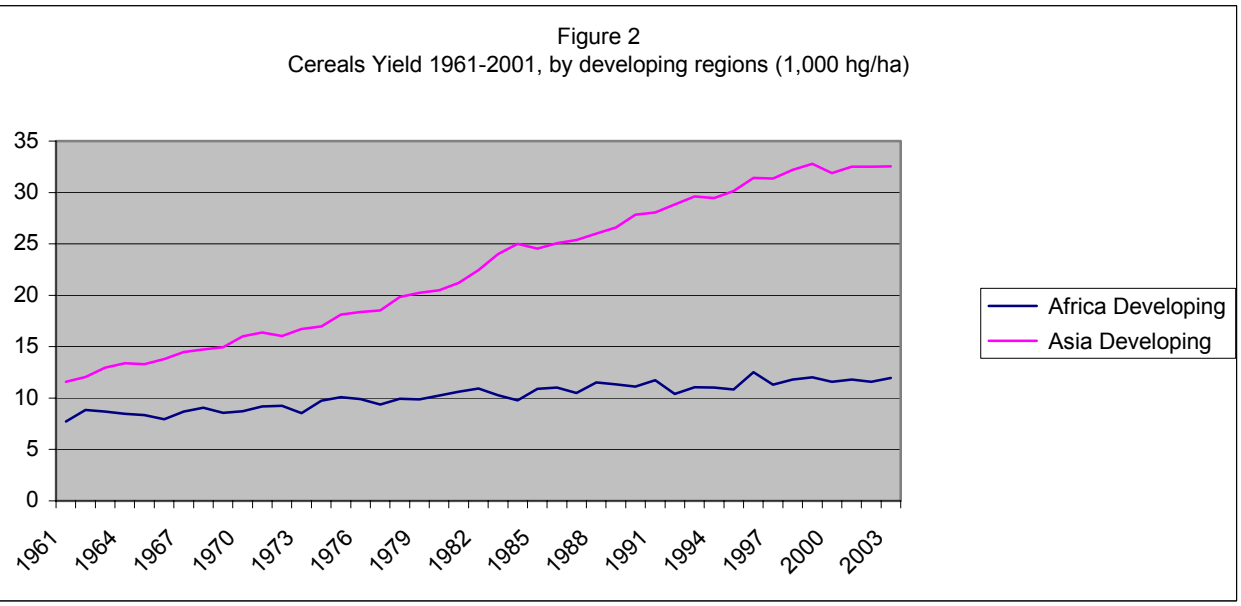
of labour per worker (e.g. kg/day/person). Land productivity is the volume of output per land unit (e.g. tonnes per hectare). Both labour productivity and land productivity can be calculated for a single product or for a set of products. Finally, total factor productivity is the volume of all outputs divided by the volume of all inputs. Here the various inputs and outputs are added up to obtain one quantity of input and one quantity of output. These are divided (output/input) to obtain a figure for total factor productivity.

Figure 1: Cereals production 1961-2001, by developing regions (mln metric tonnes)



Source: FAO (2004)

Figure 2
Cereals Yield 1961-2001, by developing regions (1,000 hg/ha)



Source: FAO (2004)

Agricultural performance in Asia over the past 40 years has been remarkable. Between 1961 and 2001, cereal production in the region's developing countries increased from 309 to 962 million tonnes, a rate of increase far in excess of population growth. In the same period, the expansion of agricultural land was comparatively modest (from 1.0 to 1.4 billion hectares). The growth in output came mostly from increasing agricultural productivity. For instance, cereals productivity nearly tripled from 1.2 to 3.3 tonnes/ha between 1961 and 2001 in developing Asia (all figures from FAO, 2004). This rate of productivity growth has had an enormous impact on economic development and poverty reduction.

In contrast, over the same period, the production of basic cereals in sub-Saharan Africa grew only fourfold, from 40 to 116 million tonnes, but the increase in production barely kept pace with population growth. Furthermore, productivity increases were very small. Thus, while cereals productivity in Africa rose by a half (from 0.8 to 1.2 tonnes/ha), most of the output growth came from using more land and labour, not more productive use of those resources. The area of agricultural land in Africa expanded from one million to one billion hectares during 1961–2001 (all figures from FAO, 2004). Weak productivity growth in agriculture had serious consequences for economic development and poverty reduction. The next section of this paper considers why agricultural productivity is important to poverty reduction.

2.3 Agricultural growth and poverty reduction – the evidence

At the macro-economic level, growth in agriculture has been consistently shown to be more beneficial to the poor than growth in other sectors. Furthermore, analysis reveals that increasing agricultural productivity has probably been the single most important factor in determining the speed and extent of poverty reduction during the past 40 years. Much of this evidence is derived from the Green Revolution in Asia – examples from Africa are noticeably fewer.

With respect to the pro-poor benefits of growth in agriculture, Datt and Ravallion (1996) showed that rural sector growth in India reduced poverty in both rural and urban areas, while economic growth in urban areas did little to reduce rural poverty. Warr (2001) provided evidence that growth in agriculture in a number of South East Asian countries significantly reduced poverty, but this was not matched by growth in manufacturing. Gallup et al. (1997) showed that every 1% growth in per capita agricultural Gross Domestic Product (GDP) led to 1.61% growth in the incomes of the poorest 20% of the population – much greater than the impact of similar increases in the manufacturing or service sectors. Numerous other studies reveal similar results, but emphasise the important qualification that the degree to which agricultural growth reduces poverty is usually conditional upon the initial distribution of assets (in particular land) and the initial level of inequality (Bourgignon and Morrison, 1998; Timmer, 1997; de Janvry and Saddoulet, 1996).

In terms of the role of agricultural productivity in reducing poverty, Thirtle et al. (2001) concluded from cross-country regression analysis that, on average, every 1% increase in labour productivity in agriculture reduced the number of people living on less than a dollar a day by between 0.6 and 1.2%. No other sector of the economy shows such a strong

correlation between productivity gains and poverty reduction. The routes through which growth in agriculture achieve such a potent impact on poverty are considered below.

2.4 Understanding how increased agricultural productivity reduces poverty

Four 'transmission mechanisms' critically link changes in agricultural performance, more especially productivity increases, to progress in reducing poverty:

- direct and relatively immediate impact of improved agricultural performance on rural incomes;
- impact of cheaper food for both urban and rural poor;
- agriculture's contribution to growth and the generation of economic opportunity in the non-farm sector; and
- agriculture's fundamental role in stimulating and sustaining economic transition, as countries (and poor people's livelihoods) shift away from being primarily agricultural towards a broader base of manufacturing and services.

The direct impact on rural poverty

Poverty remains a predominantly rural problem and agriculture is generally central to rural livelihoods. Some 70% of the workforce in sub-Saharan Africa and 67% in South Asia are at least partly engaged in agriculture (Maxwell, 2001). Therefore, any improvement in rural incomes should – if only by sheer weight of numbers – have a major impact on poverty.

The most useful assessments of the impact on poverty of changes in agriculture are those that follow farming communities' experiences over a long-term period (Lanjouw and Stern, 1998; Hazell and Ramasamy, 1991). These studies showed that agricultural productivity gains have raised rural incomes in two ways: by directly increasing farmers' incomes and, of particular importance to the poorest, by increasing employment opportunities and wages.

Farmers' incomes

De Janvry and Sadoulet (1996) estimate that in Asia, a 10% increase in total factor productivity in agriculture would raise the incomes of small-scale farmers by 5%. Acharya and Sophal (2002) report that in a 2001 sample of smallholder rice-producing farms in Cambodia, a 10% increase in yields resulted in an 8.8% increase in household incomes in dry season cultivation and a 4.4 % increase in wet season cultivation. Lipton and Longhurst (1989) and Hazell and Ramasamy (1991) provide similar evidence.

Two further observations on this issue deserve a mention. First, farm incomes have generally continued to rise despite declining market prices resulting from major output expansion. By adopting new technologies and expanding irrigation, farmers have been able to progressively reduce their unit costs of production and so remain profitable. Bangladesh provides an excellent example. Between 1980 and 2000, the real wholesale price of rice in Dhaka fell from 20 Taka to 11 Taka per kg, but over the same period, farmers increased yields from around 2 to 3.4 tonnes per hectare, effectively offsetting the impact of falling

prices on their incomes[3]. Second, there is no systematic evidence of smallholders being excluded from technology-led productivity gains. Lele and Agarwal (1989) cite evidence from Kenya, where small- and large-scale farmers exist alongside one another, grow the same crops and sell them in the same markets at similar prices. Rohrbach and Makhwaye (1999) report that in Botswana a high-yielding sorghum variety released in 1994 had been adopted by almost 50% of the nation's small-scale farmers, who had planted it within two years of its release. In some exemplary Green Revolution countries, the numerical importance of small farms in agriculture actually increased during the technological transformation of agriculture. The International Rice Research Institute (IRRI) reports that in India the proportion of land holdings of less than one hectare increased between 1960 and 1990 from 41% to 59% of the total number of holdings (IRRI, 2004).

Employment

On-farm employment is critically important to poor people's livelihoods, and not just for the landless – agricultural labouring is a key means for many farmers to supplement their incomes. Evidence on this subject is primarily drawn from the Green Revolution experience in Asia. In India increasing agricultural productivity associated with the adoption of new technologies clearly increased demand for labour. Furthermore, and of particular benefit to the poor, the majority of the additional labour used was hired rather than family labour (Lipton and Longhurst, 1989; Hazell and Ramasamy, 1991). While intensification may involve some labour-economising innovations – particularly mechanical threshing – new varieties and irrigation have allowed farmers to double- and even triple-crop the land, which has consistently increased labour demand (Binswanger, 1986).

Significant increases in agricultural wage rates have been recorded in many countries. Saxena and Farrington (2003) showed that agricultural labour wages in India rose at a rate of about 3% per annum during the 1970s and 1980s.

The impact of reduced food prices

From the mid-1960s, when Green Revolution technologies began to be adopted widely, increases in the production of staple foods in most developing countries have comfortably outstripped population growth. Only in sub-Saharan Africa have food supplies grown slower than the population during the past 40 years.

Given this significant increase in per capita supply, and the relatively low elasticity of demand for basic foods, the real world market prices of the major traded grains have been in near continuous decline since the early 1950s. At the individual country level, increased production of food grains has often had a dramatic effect on reducing prices. This is of great benefit to the poor, both in urban and rural areas where many people buy and grow their own food.

Once again, Bangladesh is a good example. Between 1980 and 2000, production of rice and wheat increased from less than 15 to over 25 million tones, increasing per capita availability from 425 to 510 grams per day, despite population increasing over the same

[3] See Working Paper 7: Agriculture, Hunger and Food Security for more on the experience of Bangladesh.

period from 90 to 191 million. Real wholesale prices of rice and wheat in Dhaka have consequently fallen dramatically (Figure 3). Thus, poor people in urban areas (and net consumers of wheat and rice in rural areas) need a smaller proportion of their incomes to meet their basic food requirements.

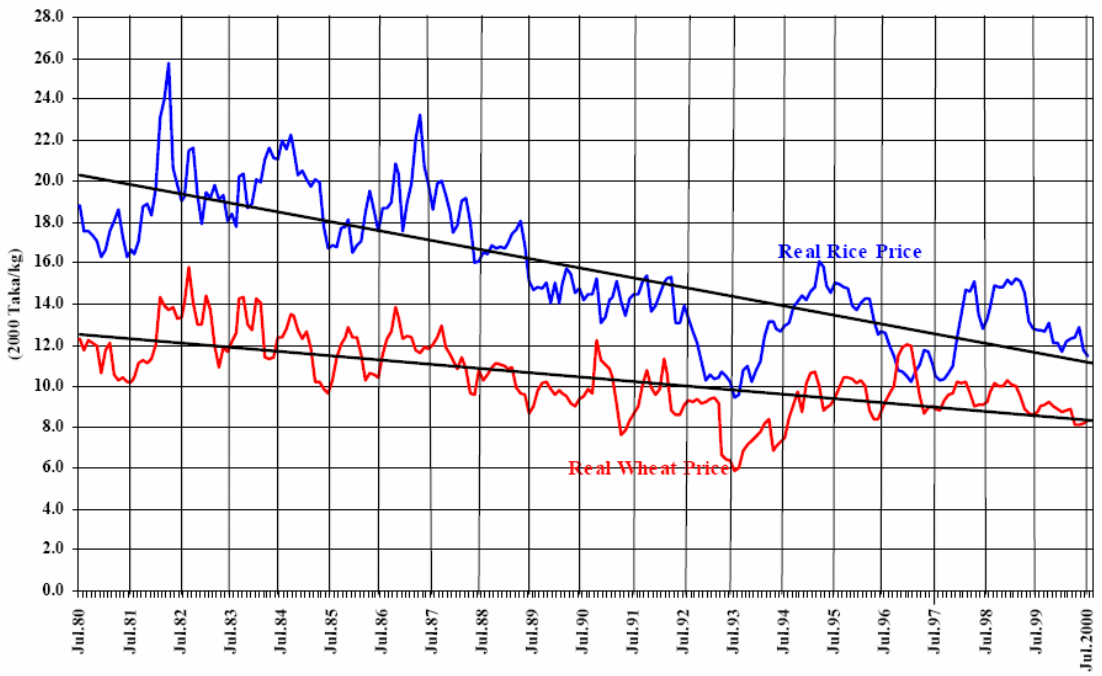


Figure 3: National average real wholesale prices of rice and wheat, 1980–2000, Bangladesh. Source: IFPRI, 2002.

Agriculture's contribution to growth and the creation of economic opportunity in the non-farm sector

Agriculture remains the economic heart of most developing countries. In Africa it provides two thirds of employment, generates over one third of Gross National Income (GNI) and over half of export earnings. In Asia, where economic growth and diversification have been most rapid, agriculture still provides jobs for 60% of the working population and 27% of GNI. Given agriculture's relative dominance in the economy, it remains the most likely source of significant growth in most developing countries. More immediately, fluctuations in agricultural performance are felt quickly, not only in the agricultural sector, but also in the wider non-farm economy.

Empirical work clearly illustrates the importance of these links. Timmer's (2003) analysis of the Kenyan economy showed that between 1987 and 2001, the rate of growth of the non-agricultural sector depended strongly on growth in agriculture. Non-agricultural growth increased by 30% of the agricultural growth rate in the same year, and by 10% of the agricultural growth rate in the previous year. Stern (1996) found a similar and significant relationship between growth in the agricultural and non-agricultural sectors during 1965–1980 for a large number of developing countries.

The extent to which changes in agricultural performance influence the wider economy is determined by the size of the 'multiplier'. This is a measure of the extent to which a unit

change in income earned in agriculture causes a change in income in the non-farm sector. The size of the multiplier will vary between places and over time, reflecting differences and changes in factors such as the amount of farm income spent on imported goods or saved. Thirtle et al. (2001) presents evidence from a number of studies and found multipliers ranging from 1.35 to 4.62.

These studies illustrate that agriculture – given its size and the impact of multipliers – is the most crucial sector for promoting broader economic growth and has greater 'knock-on' effects than any other sector. The case of Tamil Nadu (Box 2) is particularly interesting in this regard.

It has been argued that multiplier links in Africa are lower than in other parts of the world, and this has important consequences for wider economic development. However, Delgado et al. (1994) suggest a more optimistic estimate, with multipliers in excess of 1, indicating that the sector has considerable potential for stimulating broader economic growth.

Box 2: Agricultural development and its links in Tamil Nadu, India

In North Arcot District, Tamil Nadu, 11 villages were surveyed in the early 1970s at the start of the Green Revolution, and again in the early 1980s. During this time, there had been almost complete adoption of high-yielding rice varieties, with much greater use of fertiliser and irrigation resulting in a modest, but sustained 60% increase in rice output between 1963 and 1980.

However, even more remarkable was that the poor were about twice as well off in the early 1980s as in the early 1970s. Real wage rates rose by 20% for men and 10% for women. This was not due to increased labour demand in farming (labour use fell as mechanisation cut jobs). In fact, members of farming households with increased incomes no longer offered themselves as casual labour, so the labour supply reduced at the same time.

The main point, however, was the strength of growth links. For every rupee generated in increased farm output, R 1.87 was created in the off-farm economy, with about half in the demand for inputs, marketing and processing of crops, and half in meeting consumer demand.

Source: Hazell and Ramasamy (1991)

Stimulating and sustaining economic transition

The relative decline of agriculture's importance to the economy and people's livelihoods is an inevitable and desirable consequence of successful economic development. Rapid economic growth, sustained poverty reduction and substantial wealth creation have historically resulted from economic diversification, with less reliance on agriculture and more on manufacturing and services. However, history shows that most countries cannot successfully industrialise without with first achieving significant improvements in agricultural performance – particularly increased agricultural productivity. This holds true for Europe, North America, Japan, and the emerging countries of Asia where industrialisation has been very clearly agriculturally led (Timmer, 1988).

Understanding how growth in agriculture first stimulates and then sustains industrialisation has been the focus of much development thinking during the past 50 years. There is now a good theoretical understanding of how 'agricultural transformation' occurs, and a body of empirical evidence showing its effects. These are described in Lewis (1954) and Johnston and Mellor (1961) and summarised in Timmer (1988). The studies emphasise a number of key functions provided only by growth in agriculture and that enable broader economic growth and development to occur:

- generation of additional demand for goods and services produced outside of the agricultural sector as agricultural-based incomes rise – the size of agriculture and its multiplier effects is critically important here;
- generation of savings through increased farm incomes which can then be invested;
- provision of an available labour force;
- provision of affordable food which allows urban areas to develop and maintain wages rates at competitive levels; and
- provision of a raw material base to support manufacturing – processing of agricultural commodities has often been the first activity to be industrialised in many countries.

Two factors are of central importance to understanding agricultural transformation. Increased productivity (as opposed to increased production) is one key. Broad-based growth and diversification do not happen when agricultural output increases simply by using additional land or labour. Instead, greater value must be added to the land and labour used, i.e. agricultural productivity increases[4]. This is where the historical contrast between Asia and Africa is relevant.

The second factor is that there is a paradox at the heart of agricultural transformation. Investment and growth must begin in agriculture so that the wider economy can go on to outgrow it. There is nothing inherently wrong or undesirable in this transition – quite the contrary – but agriculture must grow rapidly before the transition can occur. Growth and poverty reduction strategies that aim to bypass agriculture will almost certainly fail and will probably leave the population and economy locked in low productivity agriculture and poverty.

3. Emerging issues and questions

3.1 Can agriculture still provide the key to poverty reduction?

Asia's progress in freeing millions from poverty over the past 40 years can be largely attributed to the region's success in increasing agricultural productivity. It was also important that wider circumstances, policies and measures allowed agricultural productivity to occur, and ensured its impact on the wider economy. However, the Asian experience

[4] The term 'agricultural productivity' is here used without specifying whether this is labour productivity or land productivity. During successful agricultural transformation, both typically increase, and their relative increases determine how much incomes and employment will rise'

stands in sharp contrast to Africa, where agricultural productivity has been stagnant, rates of economic growth disappointing and poverty is on the rise.

Given the above, it is easy to reach the conclusion that without a significant improvement in agricultural performance – specifically improving agricultural productivity – the outlook for growth and poverty reduction in Africa remains poor. But Africa does not have a monopoly on poverty – the largest numbers of poor people live in rural Asia. While many live in remote areas or those that are weakly integrated into the wider economy, many also live in places that have witnessed the full effect of the Green Revolution, but its impact on their poverty has been limited.

Few doubt that achieving the MDG of halving the number of people living in absolute poverty by 2015 will require a significant improvement in agricultural performance, particularly in Africa. But in looking at the future and the likelihood of this being achieved, differences of opinion emerge around two key questions:

1. Do the conditions exist for agricultural productivity to be increased where it is most needed and what part, if any, can small-scale agriculture play in achieving this?
2. Given quite fundamental differences in context between Asia in the Green Revolution and today's poorest countries, will the historical relationship between agricultural growth and poverty reduction continue to hold true?

The view taken on both these questions will have major policy implications.

3.2 Are significant improvements in agricultural productivity possible?

Increasing the pace of poverty reduction – most critically in Africa – will depend upon the extent to which agricultural productivity can be increased through a step change in agricultural performance. Simply increasing output at current productivity levels – and even this appears difficult in some places – will have little long-term impact on growth or poverty. While agreement exists on the need to increase productivity, opinion is divided on whether rapid productivity gains, similar to those seen in Asia during the Green Revolution, can be achieved elsewhere.

Much of this debate focuses on whether the economic and physical preconditions that enabled the Green Revolution to happen exist in those regions as yet untouched by this kind of transformation. Inevitably this debate seeks to contrast Africa's failure with Asia's success, but such a stark characterisation of debate should be approached cautiously. There have been incidences of rapid productivity improvement in Africa (Wiggins, 2000) and the lives of millions of poor people in Asia remain largely unchanged despite the Green Revolution (Rosset et al., 2000). However, a qualified comparison of Asia in the 1960s–1970s and sub-Saharan Africa today provides a useful basis to explore these differences.

Differences in the physical resource base – weather, water and soil

Africa's physical conditions are generally less conducive to improving agricultural productivity than those in Asia. Weather patterns are more unpredictable and soils generally less productive, making agriculture a risky venture. Farmers are often reluctant to adopt new and untried technologies because of the high cost of failure.

Availability of water resources is probably a major factor. Over the past 40 years, productivity gains achieved in irrigated areas have consistently outpaced those of rain-fed areas. For instance, maximum attainable land productivity in Indian rain-fed paddy rice production is 2,516 kg/ha compared to 8,161 kg/ha in irrigated paddy rice production. For wheat production, the respective numbers are 1,786 kg/ha and 4,352 kg/ha (FAO, 2003)[5]. Asia's success in realising the benefits of high-yielding varieties depended critically upon a massive expansion in irrigated area, from 40 million hectares in 1961–1963 to 71 million hectares in 1997–1999. In contrast, only 5 million hectares are currently irrigated in sub-Saharan Africa (most of it in South Africa), a small change from the figure of 3 million hectares irrigated in 1961–1963 (FAO, 2003). While some further increase in irrigation in Africa could be achieved, it is questionable whether Africa's water resources could support expansion on the scale seen in Asia.

Differences in population and infrastructure density

Here the argument is that Africa's population density has not yet reached the level that characterised Asia 40 years ago, and that allowed the efficient provision of rural infrastructure, such as roads and marketing facilities, in Green Revolution adopters. In the absence of such infrastructural support, the probability of small-scale farmers being able to move into semi-commercial production, which would give them the finance and incentive to purchase inputs, is much lower. Provision of rural infrastructure varies greatly in Africa, but even today it remains far below the level seen in Asia 30–40 years ago. Road density is crucial for agricultural intensificationt[6]. Yet road density in Africa is only 34 miles per square kilometre, compared to 500 in India (Riverson et al., 1991).

Declining real prices and adverse terms of trade

The greatest advance of the Green Revolution took place during the 1960s, within a particular international price environment. Since then agricultural commodity prices have more than halved in real terms as global output has expanded. Although the rate of decline appears to have slowed down since the 1980s, the question remains – are prices sufficiently remunerative to encourage farmers to innovate and take risks? Evidence has been found to support both sides.

Pessimists are particularly concerned over adverse movements in the maize fertiliser price ratio, and its implications for increasing fertiliser use, which is the key to raising yields and productivity. They note that while the real price of fertiliser has fallen, the decline in real food prices has been even greater. Optimists note that the link between international and

[5] These are all-India averages. Actual yields lie below these maximum values, with large variations in the gap between actual and maximum attainable yields over Indian states.
[6] Fan et al. (2004) calculate that in India, the increase in agricultural GDP of one rupee spent on road infrastructure is R3.17, compared to only R1.53 and R1.41 return to one rupee spent on education and irrigation, respectively. This high return also appears to hold true in Africa, as suggested by evidence from a 1998 project in Tanzania where the construction of 530 miles of rural roads in 23 districts reduced transportation costs by an average of 40% (IFPRI, 2002b).

local prices is often quite weak. Domestic markets, particularly in rural Africa, are poorly integrated into regional and international markets and high transport and distribution costs have, and may well continue to, offset at least some of the downward pressure on local prices caused by falling international prices. This is clearly illustrated in countries where the main staple is imported from neighbouring producers. Here domestic food prices are often more influenced by movements in fuel prices than changes in international commodity prices.

The impact of liberalisation on agricultural trade will have an uncertain bearing on the prices producers will realise. Accession to the World Trade Organisation (WTO) has required several countries to open up their domestic markets to competition. The impact has varied from country to country, from crop to crop and even within countries. Estimates by FAO and the United Nations Conference on Trade and Development (UNCTAD) on the impact of liberalisation on global prices have, in general, predicted an upward impact on world commodity prices, primarily as developed country production declines with the removal of farm subsidies.

Analyses of specific country experiences have shown more mixed outcomes. For example, a recent Oxfam study (2002) suggests that a 10% reduction in import tariffs on rice in Senegal resulted in a doubling of rice imports from Thailand. But even within developing countries, liberalisation will have mixed benefits tending to favour more outward-looking regions with better infrastructure and more competitive production systems. A study by Chen and Ravallion (2003) of the impact of China's accession to WTO shows that the richest rural regions benefited most, while less well developed regions suffered from falling prices due to increased openness. Predicting the producer price impact of liberalisation will be difficult, but it is unlikely to benefit the poorest agricultural producers and it seems likely that small-scale farmers will face more adverse terms of trade than their predecessors.

The impact of HIV/AIDS

A serious issue of growing importance is the impact of HIV/AIDS on agriculture. The epidemic is already having far-reaching effects on rural households and communities in sub-Saharan Africa. In Asia, although prevalence rates generally remain low, they are increasing rapidly. HIV/AIDS affects agricultural production through both labour and capital effects. Mortality and morbidity effects reduce the availability of labour, whilst the cost of treating and eventually burying those who develop AIDS diverts investments away from agriculture.

Since labour is one of the most important assets that poor people have, significant improvements in agricultural productivity will be compromised by HIV/AIDS. It will become more difficult to develop labour-intensive approaches as a strategy for reducing poverty. In certain regions and countries within Africa and Asia, it is possible that a combination of urban migration and HIV/AIDS may further exacerbate labour shortages, although this could drive up agricultural wage rates.

New barriers to trade – the impact of emerging new standards

Globalisation, as characterised by the continued expansion in world trade, increasing interdependence of world markets and the internationalisation of world production, presents additional challenges to developing countries. One new aspect is the emergence of standards imposed by national and regional bodies (such as the European Union) for reasons such as food safety (Wilson and Abiola, 2003). Nationally and internationally imposed food safety and phytosanitary standards represent a new block to export markets for large numbers of developing country producers.

The impact of changes in domestic supply chains

The impact of globalisation also extends to domestic markets. Changes in supply chains, in particular the increasing presence of large supermarket chains in many developing countries, are creating new demands on quality, quantity and timeliness of products. To meet these new demands, agriculture is becoming increasingly industrialised and capital intensive, making it harder for individual family farmers to access markets (Barrientos and Kitzinger, 2003). The most marked change has occurred in Latin America, but it is also increasingly evident in Africa. IFPRI (2004) estimates that supermarkets now account for up to 30% of food retailing in Kenya. The concern for many is that globalisation is offering opportunities to the rural poor, but as low-paid employees, rather than as farmers.

A changing policy context

A common characteristic of successful Green Revolution adopters was the primacy awarded to agriculture in national development efforts, and the role played by the state in supporting agriculture. From the 1950s onwards, Asian governments provided (and often subsidised) key inputs, constructed infrastructure (notably irrigation) and engaged in product markets to ensure stable, predictable and remunerative prices. Through such instruments, governments created a lower risk environment for agricultural innovation and increased its affordability for small-scale farmers with considerable success. In Africa, as Wiggins (2000) notes, occasional episodes of rapid agricultural development over the past 30 years have occurred when the state undertook a similar progressive role. In both instances, the approach was supported by the international development community.

Whether the provision of such public services is affordable or can be managed effectively by the state (and the evidence points to this being problematic), are matters for debate. First, it is clear that shifts in international views, particularly those of the international financial institutions, on which most of the poorest countries depend, now rule out many of the policy interventions that assisted innovation and rapid productivity growth in Asia (Dorward et al., 2004). Just how far this has negatively influenced the diffusion of new technological innovation and slowed progress in increasing productivity is a moot point. Second, whilst evidence about the precise impacts on agricultural production and agriculture-based livelihoods is very patchy, there may be policy implications associated with state involvement in driving production (in the face of reduced labour capacity) and people's access to food. Governments in Africa may be facing long-term welfare bills to support both food availability and access.

3.3 What are the best agricultural development strategies?

There is probably less of a consensus now – particularly amongst development agencies – on the best (in terms of impact on poverty and hunger) agricultural development strategy than at any time over the last half-century or longer (Ashley and Maxwell, 2001). This is particularly true of Africa, where an unsuccessful model based on improving performance through technology supported by publicly owned development agencies has been replaced by the equally disappointing response of farmers to the liberalisation of markets. Key points in the debate are considered below.

Where should development efforts be focused to achieve the greatest return in terms of reducing poverty and hunger? Should they be focused on high-potential areas where development options are greatest, or in the poorest areas where there are fewer potentials and options, but where poverty is greatest?

Who should they be focused on? Here the debate sees at least three positions:

1. Accept the demise of the peasantry and work with large-scale farmers whose success will act as a catalyst to generate wealth and jobs for those whose farms are not viable. Proponents of this view (see Maxwell, 2004) identify changes in global supply chains as being major new obstacles to smallholders that will prove insuperable for many or most.
2. Work with smallholders, but accept that most innovation, investment and commercialisation will come from only that (possibly very small) portion with more land and capital than their neighbours. Some claim that these farmers will then create enough jobs locally, through hiring labour and spending on local goods and services, to boost the welfare of other farm households (David et al., 2000).
3. Focus on the poorest and most disadvantaged smallholders to beat poverty and hunger and reduce vulnerability directly (IFPRI, 2002a and 2002b).

Should they focus on less favoured areas? These include poor households in areas of low agricultural potential that are remote from markets and supplies of inputs. There are two positions on this question:

1. In remote areas, employment opportunities in the rural non-farm economy are often limited. Thus, in spite of poor prospects in farming, people are heavily dependent on crops and livestock for their livelihoods. The promotion of and investment in agriculture should therefore be viewed as a safety net provision in itself, irrespective of whether such agriculture is contributing to growth.
2. In many of these cases, food security will be assured more by the ability to buy in food, rather than by trying to produce more. The questions posed for such areas are those of jobs and incomes. The difficulty lies in trying to create jobs where resources and infrastructure are scarce and markets remote. The answer probably lies in a combination of marginal agriculture, forestry, fishing, tourism, public employment in provision of services and physical infrastructure (and its maintenance), public transfers for social protection and regional equity, and in migration to alternative opportunities (Hite, 1997). Agricultural development may not, in these areas, be a prime mover in reducing poverty and improving food security.

What is the role of technology? Should development efforts focus mainly on yield-raising technology or on less intensive approaches that minimise variation? Malawi is a good case in point – which is the better option: high-yielding hybrid maize with fertiliser applications or lower-yielding open-pollinated varieties requiring less fertiliser?

Which crops? Should the accent be on crops that will be largely consumed within the household or on income-generating cash crops?

3.4 Two contrasting views on agricultural strategies

Most analysts agree that the context for agricultural development has changed significantly over the last 40 or so years, and is probably now less conducive to the type of smallholder-led agricultural development seen in Asia in the 1960s and 1970s. However, opinion is sharply divided on what these changes really mean for agriculture's role in poverty reduction and, in particular, what they imply for small-scale farming as a route out of poverty for millions of poor people. Two broad views exist: the smallholder optimists and the smallholder pessimists. Each offers a different interpretation of the impact of the changes outlined above on the role of agriculture in poverty reduction and suggests a very different development strategy for agriculture.

The smallholder pessimists

Pessimists (e.g. Maxwell, 2004) argue that with the changes described above, smallholder agriculture is becoming progressively less viable in many parts of the world. If these trends continue, the point will soon be reached where small-scale agriculture is so uncompetitive that it ceases to offer a direct route out of poverty for the rural poor.

This vision is consistent in many ways with the way agriculture has progressed in the developed world. It sees agriculture based around farmers who can operate within the framework of new conditions, with consolidation of small farms into larger commercial units being an inevitable consequence. While this process took generations to occur in the developed world, the pace of globalisation is such that it is occurring far more rapidly in the developing world today. Policy makers need to be aware of the possible outcomes.

As smallholder agriculture declines and rural areas become better connected to urban centres, offering new opportunities, the future for rural people may lie less in agriculture and more in other economic sectors. Pessimists note that this is already starting to happen in some places. Rural people are already diversifying their livelihoods away from agriculture and, for many, income from the non-farm rural economy, remittances, seasonal migration and even commuting are more important than that from agriculture (Lanjouw and Lanjouw, 2001; Start, 2001). Pessimists argue that while agriculture was important to poverty reduction in the past and remains an activity conducted in rural areas, this does not mean that it will automatically remain the primary means of earning a livelihood for millions of rural poor, nor does it represent an effective route out of poverty.

The smallholder optimists

This view, championed by Lipton (2004) and IFPRI (2002a and 2002b), takes a totally different tack. It states that the basic Green Revolution recipe is as valid today as it was in

the past. With the right policies and support, smallholders will innovate and increase productivity, which will directly reduce rural poverty and stimulate wider economic growth and development through the transmission mechanisms described above.

Optimists argue that the classic links between agriculture and the wider economy that worked so well in Asia, can work elsewhere today and only the smallholder works at the scale required to have any meaningful impact upon poverty. Agriculture remains the most effective engine of growth and poverty reduction, and investing in the small-scale farm sector represents the most effective way of stimulating growth and reducing poverty.

Optimists acknowledge the changes in context emphasised by the pessimists, but question the extent to which they represent terminal damage to the future of small-scale farmers, for example:

- While global consolidation in food marketing has occurred, its impact on small-scale farmers, particularly in Africa, may be relatively insignificant as the value of staple food consumption in Africa exceeds that of export commodities by a factor of three (IFPRI, 2004).
- African farmers may face increasing difficulties operating in world markets, but abundant opportunities remain in domestic and regional markets for commodities such as maize, cassava and legumes, which are grown and consumed mainly by the poor. Furthermore, the local price of these goods is generally less affected by global price trends, because of high transport costs relative to value.
- Removal of state-provided input subsidies might have had less impact on the profitability of small-scale farming than would appear. A balanced assessment of the impact of liberalisation must take account of the frequent bias against output prices often implicit in state marketing systems, and the concealed taxation of farm sales through foreign exchange manipulation.
- While the non-farm economy is of greater importance to livelihoods of the rural poor than has perhaps been recognised in the past, evidence consistently shows that it is itself largely driven by the performance of the agricultural sector (Lanjouw and Lanjouw, 2001).
- For optimists, the bottom line is that 70% of the world's absolute poor are rural, and agriculture remains critical to their livelihoods, either directly through the on-farm economy or indirectly through agriculture's influence on the non-farm economy. Projections indicate that even by 2035 (well past the date for the MDGs) 50% of the poor are likely to be rural dwellers. Reducing poverty will only become feasible when the livelihoods of the rural poor are improved directly.

Two views – two different sets of policy conclusions

The main difference between pessimists and optimists lies in their views about the timing of economic transition and whether it is possible to by-pass the first stage in agricultural transformation, i.e. the stimulus provided by a major increase in agricultural productivity in staple food crops. Fundamentally:

- Has the impact of globalisation spread so far and fast that small-scale farmers in Africa and Asia can no longer compete in their local markets against imported grains?
- Have consumption patterns changed to such an extent, even amongst the poorest, that any increase in income will be spent largely on imported foodstuffs?

- Is international penetration of local markets, and market integration at a national and regional level, developing at such a speed that opportunities in agricultural production no longer exist for poorer communities? And if this is happening, what are the options for the poorest?

The policy implications of the two perspectives are quite starkly different. For *optimists* the issue is not one of whether smallholders can succeed, but how to make sure they do. This perspective emphasises the need for increased direct investment in agriculture and rural development, with support focusing on creating institutions that will encourage and support smallholder-led agricultural development. This includes the public provision of input and output marketing services, infrastructure development and democratic processes of land reform. Price incentives will need to be in place, but optimists argue that incentives can largely be created by removing developed country policies that have artificially depressed international commodity prices.

Particular attention will need to be given to improving the productivity of staple food crops that are not internationally traded, but consumed by the poor and traded locally. As research into these crops attracts little private sector attention, there will be a need for public funding with international assistance. In addition, research must take greater account of differing natural resource environments, in particular water management and soil degradation, and become more focused and more region specific. In the future, labour-intensive approaches may not be the most suitable as HIV/AIDS reduces labour availability in some African countries in particular[7].

For *pessimists*, the strategy is more or less the opposite. They emphasise the need to achieve the best outcome for the poor from current, rapidly changing trends. As far as agriculture is concerned, efforts should be focused on encouraging commercial production of non-staple cash crops, particularly those that result in robust links to the non-farm sector, as this will be the major provider of employment for the rural poor. Influencing international policy processes will be important, but primarily to ensure access to developed country markets for more processed and high quality products from developing countries. The rural poor will be best assisted by improving their access to health and education services to improve their human capital and through measures that increase their mobility so that they can move to take up opportunities in growth areas as they occur.

[7] Although Eastwood and Lipton (2000) argue that over the next 25 years there will be a window of opportunity for growth in key countries for poverty reduction (e.g. Ethiopia, Nigeria and Bangladesh). Dependency ratios are set to fall as a result of recent fertility reductions.

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