

# **Agriculture, Growth and Rural Poverty Reduction in Africa: Fallacies, Contexts and Priorities for Research**

*A framework paper for the AERC work on Understanding  
the Links between Growth and Poverty Reduction in Africa*

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## Introduction

This paper is concerned with the links between agriculture, growth and rural poverty reduction in Africa. The perceived wisdom is that agriculture is key for growth for Africa, and that agricultural growth is key for rural poverty reduction. We critically assess this point of view, and conclude that much of the evidence for this view, its conceptual basis and its implications are far less convincing than has been portrayed. We reconstruct an alternative view, nested in both growth theory and standard dual economy models, to argue for a more contextual understanding of the role of agriculture in growth and poverty reduction. As an organizing framework we use Ndulu et al. (2008), the AERC-sponsored thinking about growth in Africa, to specify more precisely the relative role of agriculture. From this analysis comes a list of key questions that ought to be researched for a richer understanding of the role of agriculture in growth. This list is not new, but the focus of this list is arguably different from its predecessors.

The paper is organized as follows. First, we discuss some of the key arguments used to favour growth in agriculture as both an engine of growth and a key mechanism for poverty reduction. It is on purpose controversial – if only to stimulate a more precise discussion on some issues and questions. Then, we introduce the conceptual framework to link growth and agriculture in a dual economy context, specifying further how different institutional and geographical contexts affect the way we can think about agriculture and growth in Africa. Finally, we discuss four key areas of research on agriculture, growth and poverty stemming from this discussion reduction that ought to be prioritized.

### 1. Fallacies and Half-Truths

It is a truth generally acknowledged that a poor country in want of growth ought to start its growth process in agriculture. For example, the recent World Development Report 2008 on agriculture stated that stimulating agricultural growth is “vital for stimulating growth in other parts of the economy” (World Bank, 2007, p. xiii). Sachs (2005) has been calling for a ‘green revolution’ in Africa as an essential part of its development strategy. The arguments used for this view are far less convincing than they may seem at first. In fact, despite seeing them often used in policy documents, many of them are just fallacies hindering rather than helping to give agriculture its rightful place in development. Academic arguments are usually more careful, but nevertheless, these fallacies occasionally appear. In any case, the empirical universality for quite a few of these statements is not proven.

A first argument is that agriculture *should* be the basis for growth *because* a large part of GDP is agricultural and even more importantly, the majority of the population in most African countries still live from agriculture. Conceptually, this is a poor argument as growth should hardly be about just trying to ensure an increased productivity in the activity in which production factors are engaged. Stimulating growth ought to be about ensuring that factors of production, including labour and capital, are engaged in those activities that offer the highest return, and about finding sources of increasing productivity. Thinking about agriculture in isolation (or, thinking about any sector in isolation) is then clearly a fallacy:

the key question is whether factors are allocated in such a way that growth can take place, and the current allocation is hardly going to offer definitive guidance. In fact, the evidence is rather against this view: no country in the world has achieved high growth rates by keeping the share of agriculture high or more importantly by keeping more than a small share of the population in agriculture. In fact, a typical sign of success in economic development is a low share of agriculture in GDP and, even more importantly, a small share of the population living off the land.

A second argument is that *because* many people go hungry, growth in agriculture should be stimulated. This argument used to be very popular, based on a 'national food security' argument, encouraging food self-sufficiency. It went out of fashion after much debate, including the seminal work by Dreze and Sen (1989) emphasizing how people's entitlements – effectively, people's ability to obtain food, such as via their purchasing power – matters for their access to food, rather simply the production or availability of food. It surprisingly came back in fashion in the last few years, when food prices increased due to movements in global markets. While high international cereal prices may provide arguments for engaging in more food production for certain economies, the hunger of its population is not quite the appropriate argument, as more food does not necessarily leads to higher purchasing power, while high food prices in certain settings.

While these fallacies are rarely made by careful analysts, and rather trivially addressed, some of the following are more persistent. For example, a third argument is that both the history of Europe as well as the recent experiences in East Asia suggest that successful overall growth *started* with an agricultural or green revolution. In fact, much of the intellectual justification for a model of industrialization via agriculture stems from various interpretations of the historical accounts of the industrial revolution in Europe, not least in England: the simple idea is that the industrial revolution was possible because of the growth in land productivity. Historians are still debating vigorously whether an agricultural revolution, in terms of a period of rapid increases in productivity during the 18th and 19th centuries, with its seeds earlier, was a key cause of the Industrial Revolution and subsequent growth, first in England and then elsewhere in Europe; in any case, the story is not as simple as the usual textbook example (Crafts 1985; Allen, forthcoming). The timing of the growth in labour productivity is disputed, some dating it much earlier than commonly suggested (Allen 1998, 1999), while others present evidence to dispute that there was any significant productivity increase in agriculture in England in the period 1560 to 1850 at all, so that its role as a precursor for overall growth increases is even more minimal (Clark, 2002). Recent comparisons of European agricultural productivity with levels in the Yangtze Delta in the 17th to early 19th centuries suggest that Chinese land and labour productivity in agriculture were close to the best performers in Europe in that period (England and the Low Countries), undermining the view that agricultural circumstances allowed industrialization to take off in these countries and not elsewhere (Allen, forthcoming). Furthermore, productivity increases in agriculture are more likely to have been a consequence of the Industrial Revolution, rather than a precursor. One factor was competition over labour (Gantham 1989). Another key factor is likely to have been the growth in demand pushing up prices and incentives to invest in agriculture: Allen (2009) argues that the expansion of Paris in the nineteenth century led to intensification of production techniques in its surrounds, and, similarly, that the growth of London caused enclosure of grain lands and their conversion to pasture in its surrounds.

In short, there is little evidence in favour of the textbook sequence of an agricultural revolution followed by an industrial revolution.

This provides an interesting parallel with recent East Asian experiences, where agricultural growth indeed was part of the high growth experience, but it took place in a context of increased incentives. For example, China's agricultural growth since 1985 was precipitated by measures that offered a strong increase in returns on offer to farmers via the liberalization of agricultural prices, resulting in a significant increase at the outset of the economic reform process, and the freeing of households to specialize in crops with high returns. In countries like Vietnam, growth in agriculture took place alongside fast growing urban demand and sustained incentives, including for export. Green revolution technologies helped of course this process across East-Asia, but was not necessarily enough: in the Philippines, for example, Hayami (2006) shows that the green revolution from the 1960s, linked to the high yield rice varieties gradually resulted in rice price declines, resulting in only slow agricultural income increases. Similarly, it is hard to argue that growth in agriculture in India after the green revolution led to fast growth elsewhere in the economy, and current high growth rates appear closely linked to fast services growth. In sum, the historical or more recent Asian evidence for sequencing of growth efforts, starting first from agriculture to feed into other sectors, is not well established, and if anything, growth in other parts of the economy may well have been required to feed growth in agriculture.

This leads to a related and fourth argument, or at least only half-truth, that the evidence shows that growth linkages from agriculture to other sectors are far higher than from non-agricultural growth to agricultural growth. The current views on this typically refer back to Mellor (e.g. 1995). Two types of linkages are typically considered: *production linkages*, whereby increases in agricultural output lead to greater supply of inputs used in non-agricultural production or, conversely, greater demand for non-agricultural outputs used in agricultural production; and *consumption linkages*, whereby increases in agricultural income lead to increased demand for non-agricultural (as well as agricultural) consumption goods. The former are typically acknowledged not to be very high and demand linkages are emphasized. The existence of strong demand linkages from agriculture are then often claimed, e.g. as Mellor (1995) put it: "...[rural people] will spend at least 70 percent of their incremental income on consumption goods... [and] the producers of agricultural commodities spend little of that incremental income on increased consumption of basic food staples. [p.13]" If true, this suggests that agricultural growth will tend to stimulate production in other sectors, via its demand effects. This is indeed argued to be case not least for Africa (for a review, see Staatz and Dembele 2007).

Obviously, this is an empirical question, but typically not one that is well addressed. In general, the extent of such consumption linkages cannot be expected to be present uniformly across all contexts and countries. When income elasticities are not constant, the starting incomes of the agricultural sector will matter as well: marginal propensities to consume agricultural goods are likely to be higher at lower levels of income. Furthermore, transportation costs and the physical and institutional linkages of markets will impact upon the marginal propensity to consume out of non-agricultural goods in rural areas: poor access to urban markets will dampen any potential stimulus to industrial demand.

The existing literature depends on Social Accounting Matrices, often difficult to compile without much guess work, which are then used to assess linkages. Causal relationships are poorly established, and the evidence, while interesting, can hardly be used to assess what are the actual drivers of growth. Consider for example a recent study by Diao et al. (2007), who present a pair of economy-wide models for Ethiopia, based on parameterizations of input-output coefficients, demand elasticities, and other estimated parameters of the economy. These models are used both to explore the growth impacts of a given, *exogenous* rate of technological improvement in one sector or another, and to compare growth rates required in specific subsectors in order to achieve a given target rate of growth for the economy as a whole. However, these models do not set out to consider the *causes* of growth in these agricultural subsectors (where would these exogenous changes come from?); nor (since they generally make simplifying assumptions about the elasticity of supply from industry or other sectors) do they assess the tradeoffs in resource allocation and the complementarities in demand and production implied. Studies that rely more on econometric evidence do not fare necessarily better. The econometric evidence is affected by simultaneity problems, with little scope for convincing use of instrumental variables, hardly resolved by using panel data (World Bank 2007). It is a research programme with serious inherent difficulties that is not offering the evidence that hard-core proponents claim exist.

An approach that handles causality poorly is hardly the route to take to understand whether agriculture is the driver of growth and poverty reduction. Arguably, the lack of a clear well-established theoretical framework is one of the weaknesses of the linkages literature. Dual economy models offer such a well-established theoretical framework, modelling the interactions between a traditional (rural, agricultural) sector and a modern (urban, industrial) sector. In the next section, these models are cast in the context of our growth and poverty reduction discussion. A fallacy is in any case that if the Mellor conjecture is *not* true, and that farmers spend a large part of their incremental income on food, then agricultural growth is *not* conducive for growth: if anything, it depends, and in the next section this will be discussed further.

Before turning to this, three linked arguments need to be addressed as well, and they relate not to growth per se but to poverty and poverty reduction. It is often heard that agricultural and rural development has to be a priority because this is where the poor live. Furthermore, if poverty is not attacked in rural areas, we will get faster migration and a continuation of the process of the urbanization of poverty. As 'locational' arguments can be easily dismissed (as was done above), a related argument is often offered, namely that the evidence on poverty reduction shows that for growth to deliver substantial poverty reduction, growth in agriculture is required, an argument for example offered in the World Development Report (2007).

It is undeniable that poverty is still predominantly a rural phenomenon. Pick a random poor person in the world and the odds are that this person will be living and working in the rural areas as a farmer or agricultural worker. This is true across the world, including in Africa: sub-Saharan Africa has the highest poverty rate overall, and rural poverty is about a quarter higher than urban poverty, with 65 percent of the population and 70 percent of the poor living in rural areas (Ravallion and others 2007). They also calculated that there has been little change in this pattern in recent years: a very marginal decrease in

rural poverty and stagnating urban poverty rates, with a growing share of the urban population in the total population, are jointly responsible for a more substantial urbanization of poverty and little change in total poverty. But this does not say anything about whether agriculture or rural development should be a priority per se or to avoid a further urbanization of poverty.

To consider these arguments, first it cannot be emphasized enough that migration will have to be an essential part of poverty reduction in rural areas: a smaller share of the population engaged in agriculture is an essential sign of the necessary economic transformation in Africa, and for poverty reduction. The question is then what will deliver that transformation, and how to get a huge part of the population out of agriculture and the rural areas. In any case, one would hardly suggest a policy to strongly encourage resettlement (even though the Ethiopian government tried to do just this not long ago). But migration is obviously occurring probably more than ever before. Table 1 offers an interesting snapshot of what this means for a poor population. The table (from Beegle et al. 2008) is reporting on a rather unique longitudinal survey. In 1991-94, a longitudinal survey took place in Kagera, a region in Tanzania near Lake Victoria, in which about 800 households were surveyed. In 2004, a new round took place, but not simple the usual revisit of the same 'households' in the villages they were initially resident. This time all the individuals that were members of any of the original households were tracked, wherever they were. This meant that it became an individual panel data survey, and not just confined to the original villages. In fact, 43% of the surviving individuals were found in other locations, some not too far away, but others hundreds of kilometers away in urban centres across Tanzania and in neighbouring countries. Overall, about 87% of the surviving individuals were traced, resulting in a sample of several thousand households in which these individuals were now residing.

The data provide a relevant perspective on the changes in poverty of this population (based on the consumption per capita of the household an individual lives in). Table 1 reports poverty headcount levels using a poverty line not dissimilar to the national poverty line in 1991. We report poverty at baseline (1991) and poverty in 2004, and the difference between these levels and its statistical significance. Overall poverty went down from 35% to 27%. But if the survey had been using 'standard' techniques, in which only households and individuals were traced in the original village (e.g. by homestead) then poverty declines had been far lower, from 36% to 32%. Even more strikingly, the further someone had gone the larger the poverty decline. Those moving out of Kagera experienced the largest declines from 30% to 7%. The data also showed that moving from rural to urban areas had highest impacts, as well as combining migration with moving from agriculture into non-agriculture as a main activity.

Of course, this is not the same as arguing that migration caused this poverty decline. For example, the standard argument against this is that those who moved were systematically more able to earn higher incomes so the impact of migration is overstated. If they had stayed in the village they would have been better off as well. Against this, for our purposes, it can simply be noted as such a large percentage of the

population moved, and that the migrants are doing particularly well: they did migrate, even if we may believe that they could have done well in their original location.<sup>1</sup>

**Table 1 Poverty and spatial mobility in Kagera, Tanzania**

<i>Variable</i>	<i>2004 location</i>	<i>mean 1991</i>	<i>mean 2004</i>	<i>difference means</i>	<i>N</i>
Consumption	within village/neighbourhood	0.36	0.32	-0.04***	2611
poverty	nearby village/area	0.33	0.22	-0.11***	566
Headcount	elsewhere in Kagera	0.37	0.24	-0.13***	571
	out of Kagera	0.30	0.07	-0.23***	327
	full Sample	0.35	0.27	-0.08***	4075

Source: Beegle et al. 2008 (\*\*\*=difference significant at 1%)

In short, rural poverty cannot be looked upon in isolation, and migration in search of a better life has to be seen as an essential and necessary part of policy towards these areas. The evidence above suggests that migration opportunities are taken with on average strong effects on poverty. An active policy to reduce poverty focused on rural areas because this is where people live or to keep people there because migration will have negative effects would seem poorly conceived and may even remove a key option for the poor to leave poverty. This is not to say that by necessity, the marginal return to spending on migration opportunities will always be better than spending on agriculture, but it is a choice that should be considered, not least as the share of the population living off agriculture will have to come down during economic transformation. For agricultural policy, and more broadly rural development policy, this offers a striking challenge: it would seem worth to always ask whether any policy implemented is congruent with creating conditions and opportunities for farmers to leave farming and their current home areas – which is not often a question addressed when discussing agriculture.<sup>2</sup>

A more subtle point is that countries with thriving agriculture tend to experience growth that is more pro-poor. For example, in China, it is estimated that growth from agricultural growth contributed up to four times more to poverty reduction than growth from industry or the service sector (Ravallion and Chen 2007). Evidence from India suggests a more subtle message: the impact of the growth in agriculture is matched by growth in services in terms of their poverty-reducing effects, although these

<sup>1</sup> Beegle et al. (2008) analyze these data further, and suggest that controlling for individual and household fixed effects and a large number of covariates reflecting earning ability, migration still has a strong impact on consumption and poverty. There are some signs that more people leave from families with higher earning ability, but the return to migration controlling for this is still approximately 36%. The evidence shows that moving from rural to urban had highest impacts, as well as moving from agriculture into non-agriculture as a main activity. However, even controlling for these changes, spatial mobility per se still contributed independently to consumption changes.

<sup>2</sup> But what about the urbanization of poverty? With migration of rural poor to urban areas, these figures could mean anything, both positive or negative for poverty overall. What matters is not the inflow of poor into urban areas but the rate at which they then can exit poverty once in urban areas.

effects, from non-farm growth, are larger in states with higher initial land productivity (Ravallion and Datt 1996, 2002). To understand this, the key for poverty reduction is labour productivity growth, rather than overall productivity growth. Agricultural growth could be more labour-intensive, but this is not so by necessity. Furthermore, withdrawing labour from agriculture can be key to labour productivity increases. In any case, it does not offer an argument that growth should start in agriculture: for growth to be pro-poor, one needs growth to start with. One can easily conceive growth that is less pro-poor to have a larger impact on poverty in size, compared to a more pro-poor growth process, if the level of growth is higher in the former case compared to the latter.

This all leads to the need to have a careful conceptualization of how in an initially agricultural economy with high poverty both growth and poverty reduction can come about and the role of agriculture in this context. It is clear that poverty is highest in rural areas, but is that sufficient reason to focus on rural areas and agriculture in Africa? Successful poverty reduction is not simply equated with relatively high growth in agriculture. At best, during periods of rapid poverty reduction correlated with growth, rural growth is likely to be important for poverty reduction. But the evidence from other parts of the world suggests that successful growth is associated with growth in the non-agricultural sector fast outpacing agricultural growth – it has to be like that for economic transformation to take place. For example, since 1990, agricultural and non-agricultural growth in East Asia has been high, but non-agricultural growth was about 5 percentage points higher than agricultural growth. In South Asia, growth picked up considerably, but with non-agricultural growth 3 percentage points higher than agricultural growth. In sub-Saharan Africa, there was some growth just above population growth, but no sign of transformation, with agricultural growth similar or even superior to non-agricultural growth.

Both for understanding growth and poverty reduction, it would be wrong to naively focus only on what happens in the rural sector or in agriculture. Analysis will have to be done in the context of overall growth and changes, taking into account rural–urban linkages. The workhorse for understanding these are dual economy models, and revisiting them to ask what they mean for current-day Africa is the purpose of the next section.

## 2. Dual Economy models revisited

The classic treatment of rural-urban or intersectoral linkages is the dual economy model of Lewis (1954), but a vast number of variations have been produced. Vines and Zeitlin (2008) have an excellent overview; the standard Lewis model has an excellent treatment in Ray (1998). Dual economy models offer an insight into the long-run growth process by focusing on the transfer of an economy's factors of production, and labour in particular, across sectors, typically a traditional agricultural sector producing food and a 'modern' industrial sector.<sup>3</sup> There are two strands of dual economy models – the classical

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<sup>3</sup>One may wonder why we only consider two sectors, and not, for example, also an export agricultural sector and an urban informal sector. We will comment below further on what the implications are of introducing an export agricultural sector, but at this stage is sufficient to note that as our focus is on interactions between sectors that may make agriculture possibly



and neoclassical. The common feature is that the two sectors are fundamentally asymmetrically treated, whereby the two sectors in any case differ in their technologies of production, but often also in the process of wage determination and the nature of the commodity produced (from the point of demand, with agriculture producing a 'more essential' commodity, food). As the key insights come from agriculture producing *food*, we will use agriculture below as referring to food production only.

In the classical model, there is surplus labour in the rural (food producing) sector; in the neoclassical model, marginal products are equated across sectors. Surplus labour assumes two features: first, that the marginal product of individual labourers in agriculture is low, and possibly zero, and second, agricultural incomes exceed this marginal product, for example because rural households share the returns to land as well as labour. The implication is that withdrawing farmers from the rural economy does not need to have an impact on overall food production. It is generally assumed in both models that there is a high income elasticity of consumption for non-farm goods; in the neoclassical model, it is further assumed that there is no willingness to substitute industrial for agricultural consumption below a threshold level of subsistence consumption.

### *The Basic Model*

The classical model allows capital accumulation in the urban sector only, while technological change can create growth in both sectors. Capital accumulation in the urban sector creates jobs and draws workers out of agriculture. Until the marginal product of labour in agriculture exceeds the 'actual' wage in that sector, there can be no impact on real wages – in a sense the goal of development policy on this model should be to fasten processes which lead to such an efficient allocation of factors. But falling total output in agriculture causes domestic terms of trade to deteriorate against the urban sector. Since workers at low levels of incomes have only limited willingness to substitute the consumption of industrial for agricultural goods, they must be paid a higher wage in terms of industrial output, and this retards the process of capital accumulation and growth. This defines two roles for technical change in agriculture in the growth process: it can increase the *total* output of agriculture to industry, thereby helping to preserve terms of trade that are favorable to capital accumulation in the face of a growing urban labour force, and it can increase the *marginal* product of labour, thereby speeding the arrival of the point at which this marginal product exceeds the earlier earnings of surplus labourers, and real wages can rise. But in early stages of development, it will be *only* improvements in land productivity (or, equivalently, the average product of labour) that matter, given the surplus labour assumption. Labour productivity increases will at first not reduce poverty. In the classical dual economy model, when poverty is still high, the key role for agriculture is to guarantee the rate of accumulation in the non-agricultural sector, and its impact on rural poverty works through the urban economy.

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*different* from other sectors. The key is that food has specific characteristics as a food is crucial in families' consumption basket as well as produced in the rural sector, providing the basis for the key link between the sectors in the economy. Even if one were to expand the model to include two more sectors, all the key insights on the questions addressed in this paper stem from the role food plays in consumption and real wage determination. As a result, we tend to use 'agriculture' as referring to food producing agriculture.

By contrast, in a neoclassical dual economy, the surplus labour condition does not hold. Workers in the agricultural sector have positive marginal products. Moreover, labour markets are assumed to be competitive in the neoclassical model. Under this condition, this marginal product of labour in agriculture determines incomes. With agricultural incomes determined this way, increases in the *marginal* product of labour in either the urban or rural sector plays an *immediate* role in the growth of nominal wages. The importance of the marginal product of labour as a source of real income growth is a key distinction of the neoclassical model. The way in which this translates into growth in real wages depends on income levels. Neoclassical models such as those of Jorgenson (1961,1969) and Eswaran and Kotwal (1993) have typically assumed that workers have hierarchical preferences: below some threshold level of consumption, they are unwilling to substitute industrial output for agricultural output, that is, to “eat shirts”. Consequently, workers do not benefit from increases in labour productivity in the industrial sector, which merely increase the supply of a good that they do not consume. On the other hand, advances in agricultural productivity are required to release labour into other sectors, and these productivity advances – by increasing the supply of food – are a source of real wage growth at low levels of income.

This is crucial for a view of how growth and poverty reduction would go hand-in-hand: in the neoclassical model, the nominal wage increase following industrial total factor productivity growth (increasing also labour productivity) would be eroded by food price increases, as the poor spend all extra on food and no new food enters the market. As there is no real wage growth, poverty will not go down. If there is growth in productivity in agriculture, increasing food supply, then real wages can go up.

In both models, agriculture has a useful role in the overall growth process. In the neoclassical model, especially as set up by Eswaran and Kotwal (1993), it is the key route to growth and the only route to poverty reduction. In the classical model, the role of agriculture is arguably more indirect, initially as a means of feeding urban growth, but not less essential, although the poverty impact will be slower or possibly non-existing. While we may need agricultural output growth as part of a balanced growth strategy to keep the growth of nominal industrial wages in check, poverty reduction *requires* real wage growth. The extent to which agricultural growth and labour migration involves growth in the marginal product of labour is then relevant.

### *Open Dual Economy*

However, a key assumption made thus far is that the economy is closed. If the economy is open, the role of agriculture actually changes considerably. Openness to trade changes the relationship between agricultural productivity and growth in both the classical and neoclassical models. In the classical dual economy model of a closed economy, increases in agricultural (land) productivity were important in order to stave off deterioration in domestic terms of trade. When the classical dual economy becomes an open one, then relative prices of agricultural and industrial goods are pinned down by international markets. Food production and marketed surplus become less important. In a perfectly open economy, if rural-urban migration brings about a decrease in the marketed surplus available per non-agricultural worker, this will no longer result in rising relative prices for food. This reduces the importance (from a growth perspective) of technical changes in agriculture, such as mechanization, that increase land

productivity and the average product of labour but have a limited effect on the marginal product of labour. On the other hand, this decoupling of food prices from domestic supply frees smallholder agriculture to act as a source of real wage growth in and of itself. Labour-intensive technological changes, which may include shifts to high value added crops, can speed the growth in labour's marginal product, which will ultimately drive real wage growth in agriculture and beyond.

In the neoclassical model, with integrated labour markets, opening of the economy removes the primacy of agricultural growth as the essential driver of growth and poverty reduction. Industrial TFP growth, as long as it leads to labour productivity growth, will increase real wages, as the food supply constraint is lifted. Resources should just be allocated to the sectors with the highest returns – there is nothing specific anymore about agriculture and food production.

Introducing non-food agriculture does not change these core insights at all. It introduces a commodity that does not feature in consumption of either rural or urban dwellers, with most plausibly only an export markets. Assumptions can be made about whether surplus labour would also affect these activities or neoclassical assumptions on marginal products would be valid (so that it follows the marginal product of the urban sector). In the latter case it would behave as the modern sector interacting with the food production sector. In any case, the role of food production in growth would be similar as before, and this remains the key mechanism to consider.

### *Relevance for Africa?*

Are these results relevant for sub-Saharan Africa? There are a number of key assumptions in this model that require attention, not least in terms of choosing between a 'neoclassical' view and a 'classical' view, as well as the 'openness' assumption. Each has clearly different implications, but many may be tempted to suggest that models popular in the 1950s and 1960s should hardly be given the attention I am giving them now. In fact, these models may be more relevant now than before. They all assume well-functioning output markets, linking urban and rural areas. With much investment in infrastructure, there is considerable evidence that output markets are increasingly better integrated. Similarly, urban and rural markets are assumed to function without much government intervention, which is more consistent with reality now than it was a few decades ago, and price and wage formation is increasingly free. Also, food markets are more integrated with international markets, and this was well illustrated during the recent high international food price situation which pushed up prices across Africa as well, even if food imports and exports are still controlled in many economies. As was discussed, the labour market assumptions are key to choose between a classical and neoclassical version. Surplus labour is hardly an assumption commonly made in most microeconomic analysis of rural settings, but whether marginal products are equated between rural and urban settings in other settings remains another issue. Still, rural-urban migration may well have impacts on food prices. In Dercon and Zeitlin (2009) a link between urban population growth rates and food price growth across the main towns of Ethiopia was found, suggestive of non-zero marginal products, and offering some support for a neoclassical view.

In the neoclassical model, if growth is driven by agricultural growth that is technologically neutral or labour intensive, then the scope for poverty reduction will be larger. Land is typically not highly unequally distributed in most African countries, where there is relatively low landlessness and where, in some countries, such as Ethiopia, there is a remarkably equal land distribution. Productivity increases will reward the poorer farmers as well, so that growth may have substantial poverty impacts. The changing circumstances in African agriculture, in terms of allowing many factor and product markets to work more freely, especially in terms of removing much of the urban bias, has improved the opportunities for this process to materialize. A “green revolution for Africa” may have substantial returns also in poverty reduction. Does this mean we have come full circle in this paper, and we can argue that the best way to stimulate poverty reduction is an “agriculture first” agenda, focusing on food?

The necessity of agricultural growth to deliver both growth and poverty reduction is not so clear-cut. As in the model, opening up the economy has removed the crucial dependence on progress in agriculture for delivering poverty reduction as the crucial demand linkage with agriculture is removed: growth in other sectors, provided it is labour intensive, can similarly promote poverty reduction.<sup>4</sup> To assess the case for the crucial role of agricultural growth, the growth opportunities for Africa have to be considered.

### *Applying these models to Africa*

Recent work by Ndulu and others (2008) provides the foundation for a suggestive three-way description of the growth opportunities of Sub-saharan African countries; a similar description is used in Collier (2007). These researchers make distinctions in terms of growth opportunities: first, there are resource-rich economies; second, there are coastal and other well-located countries; third, there are land-locked economies without natural resources. Each of these groups has very different problems at their core when trying to boost growth and to reduce poverty.

For resource-rich economies, the key issue is to manage wealth: how to translate the underlying wealth controlled by the nation into the basis for sustainable and shared prosperity. The key problems they tend to face are Dutch disease and governance problems, and they are more likely to be ravaged by violent conflict—think Nigeria, Angola, or Congo.

For coastal and other well-located countries the challenge is very different. They have no natural resources, and so no immediate source of wealth. Wealth needs to be generated. They have two production factors they can put to good use: they have people and they have their location to their advantage. Much of coastal Africa, not least Ghana, Côte d’Ivoire, Kenya, Tanzania, and South Africa, spring to mind. Their main challenge is how to take advantage of the opportunities offered by their location. They are countries that in principle should be able to take advantage of world trade

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<sup>4</sup> High food prices, as occurred in the last few years, do not change this principle, beyond that it is more likely that profitable growth opportunities exist in agriculture; but this does not make agricultural growth *essential* for growth and poverty reduction.

opportunities, so their priorities are likely to have to include building up trade infrastructure, managing market institutions and regulation, investing in skills, and supporting the formation of well-working labour markets. These are very different challenges, but globalization offers serious opportunities for them. Without working on their constraints, they are bound to be left behind; but the potential is there.

This leaves the landlocked, resource-poor economies without natural resources. They are suffering most from the agglomeration effects investment: they have little to offer, and they totally depend on their neighbours to overcome their constraints. Matters are made worse if their better located or better endowed neighbours are mishandling their economies, or indeed if they are in conflict with these states. All these factors are creating further negative externalities. Examples are Burundi, Burkina Faso, and Ethiopia.

What does this mean for (food) agriculture in such economies? Table 2 summarizes these findings. Linking it to the dual economy models above, the coastal and other well-located countries have the most straightforward context. As openness creates opportunities for these countries, an open dual economy model is offering the appropriate framework. The key implication from the analysis above is that agriculture and especially food production does not need to be a key constraint for growth, and growth is most appropriate fostered via trade, taking advantage of its location. Non-food agriculture can take its place as one of the sources of growth, but it could be one priority among many. Managing their comparative advantage, via labour markets, skills, regulation, and investment climate, is most essential. The key is to remove the constraints for these countries to take advantage of these world trade opportunities.

**Table 2 Growth Opportunities and the Role of Agriculture**

	Coastal states	Resource rich	Landlocked with poor neighbours
<b>Key source of growth?</b>	Labour intensive manufacturing for exports.	Sensible investment of natural resource wealth for diversification.	Agriculture? Out-Migration for remittances?
<b>Constraint?</b>	How to get started?	Governance, with need to handle Dutch disease	How to get started?
<b>Plausible Model for Agriculture in Growth?</b>	Open economy dual economy model, agriculture focusing on food is definitely not key.	Tri-sector model, with political economy, agriculture (both food and non-food) as source of diversification.	Closed economy dual economy model; food production in agriculture is likely to be key.

<b>Nature of rural policy?</b>	Rural policy to prepare for migration and agricultural transformation; Skill formation possibly superior to agricultural growth.	Agricultural investment as a source of diversification. If landlocked, food supply matters, but wealth can be used for poverty reduction.	Need for food production; relative bias in favour of high potential areas and growth.
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The role of (food) agriculture is similar to the neoclassical dual economy model with openness: “industrial” progress is most likely the best route and a vehicle to take advantage of trade opportunities. The role of agriculture is then more subsidiary: it makes sense to encourage progress in agriculture as well, but mainly as a means of managing an exit from agriculture when trade-based growth takes off. Agricultural opportunities should not be avoided, and spending on rural development, including agriculture may be justified, but with the explicit consideration to help foster both increases in the marginal product of labour and the ultimate exit of much labour from agriculture, as the main process to alleviate poverty. A key mechanism is likely to be skill creation via better health and education, also in the rural sector, is then most helpful as well, if only since it will facilitate the development of better skilled labour that can in due course be absorbed. The experience of Indonesia in the late 1970s and 1980s is rather reminiscent of this, with active rural policies but which ultimately led to more absorption in the urban economy. Increased spending on health and education – whether by households or by the government – will ultimately increase the supply of skilled labour to other sectors. Mao and Schive (1995) argue that this was similarly important to the absorption of Taiwan’s immigrants in non-farm employment during that country’s agricultural boom (a boom in which migration from rural to urban areas grew from 19,000 individuals per year during the period 1952 – 1964 to more than 93,000 individuals per year in the period 1963 – 1973). See Estudillo and Otsuka (1999) and Hayami (2006) for related evidence from the Philippines.

In such economies, there may always be room for high-value agricultural activities (such as horticulture or other export crops) as effective means for taking advantage of locational and other advantages. Import competition via basic food production may make sense as well, but within an open economy context and not using protection: food imports could well be part of the economic transformation. For these African economies, the key challenge is to overcome their relative marginalization in the world economy, as latecomers are put at a disadvantage when competing with countries that have already an established industrial base, such as many Asian economies. This may require specific support for manufacturing industrial development for this potential to materialize, but this is still the best route for growth.

Next, we consider the resource-rich countries. The dominance of the natural resource sector – be it diamonds, oil, copper or any other natural resource, means that a dual economy model is hardly appropriate. A three-sector model with the natural resource sector, agriculture and ‘industry’ is required, the latter reflecting the dual economy elements of the economy. Given the wealth of the

economy, agriculture is unlikely to be an essential driver of growth. Nevertheless, both for macroeconomic reasons (Dutch disease) and within a process of long-run diversification, agriculture is likely to be important. The nature of the macroeconomic effects and agriculture's role in diversification will depend on whether agriculture is a tradable (i.e. the economy's location means that 'open' economy assumptions for agriculture are appropriate) or whether it is non-tradable. If it is non-tradable, food production and investment in agriculture will be essential for driving industrial growth, just as in the closed economy version of the dual economy model. If it is tradable, its role in industrial growth as part of economic diversification is less crucial, although any opportunities available should be grabbed. Nevertheless, the macroeconomic pressures from Dutch disease, affecting real exchange rates and relative sectoral prices, will affect incentives for agricultural investment as part diversification.

Dutch disease may actually be less of a problem from a macroeconomic point of view compared to the natural resource curse effects, related to poor governance. In principle, and not least from the point of poverty alleviation, good governance of natural resource rents, including by effective forms of pro-poor redistribution would offer huge opportunities for rural policies favouring the poor, and agricultural investment could be part of this. In this context, the burden of agricultural growth to drive overall growth is not present, so that efforts for intensification or diversification can have a much more pro-poor bias. This could involve a focus on smallholder agriculture, for example by supporting new technologies and activities with higher labour productivity. But clearly, there are a variety of ways to encourage the distribution of the wealth in such a country, and it would be hard to argue that stimulating agricultural growth is essential. In fact, given the big public purse, one governance problem, related to the natural resource, may be replaced by an all too familiar new governance problem: a rent-seeking, politically powerful agricultural sector as in Europe or the US. Moreover, investing in rural areas, including in basic services such as health, education, and infrastructure, could be an effective alternative form of redistribution, and it may have higher long-term returns in terms of transforming the economy than a narrow focus on agriculture.

The third category, the landlocked, resource-poor countries are a rather different problem. In many cases—think of Ethiopia or Burkina Faso—the agricultural base is at best highly vulnerable. But their risk of total marginalization relative to the world economy is also highest. They are mainly dependent on the ability of their better located neighbours to pull them into trade-oriented opportunities, often involving migrant labour. In terms of active policies, the opportunities are limited: infrastructure and skill creation are sensible, but as locations for investment they are likely to remain down the pecking order for a long time, not least because many of their better located neighbours are still only barely integrating with the world economy at present. As a consequence, the best way to think of these economies is as if they were closed economies. As the dual but closed economy model predicts, agricultural growth is then essential for both growth and poverty reduction—but don't expect any miracles.

Can trade liberalization not work in that case to remove this constraint? Even with openness with regard to agricultural commodities, and access to some trade routes through their neighbours, for a wide range of domestic prices for the main staples, these economies would still be effectively closed. Figure 1 offers the recent evolution of maize prices in Ethiopia, one of the three main staples, and contrary to the main

staple, teff, it has a well established international market. We give the Addis Ababa wholesale market price in US dollars per tonne, as well as the export and import parity prices. They are the prices on the international market but as seen from Addis Ababa: minus transport and marketing costs, we get the export parity price, and plus these costs, it is the import parity price. Once the wholesale market price goes below the export parity price, it becomes profitable to export, and once it is above the import parity price, it is profitable to import.

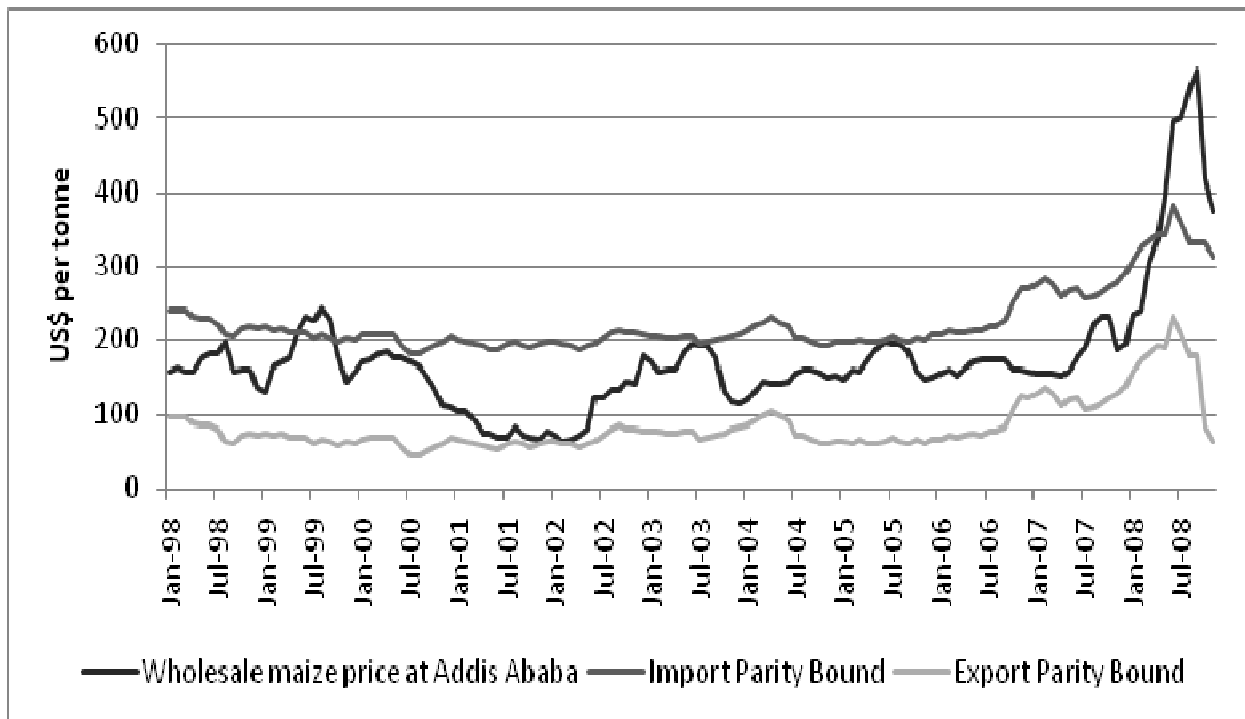
The key feature of this graph is that the gap between the export and import parity price is rather substantial: the gap was typically about \$120 US dollar, but increased in recent years with rising transport prices. In fact, the gap is typically higher than the export parity price: the share for a seller in Addis Ababa is smaller than the share of the transport and marketing cost once exported. Furthermore, this is the Addis Ababa price, and not the price for the farmer, who would get an ever smaller share of the international price. This happened most dramatically in 2001/02, when a bumper harvest meant that maize was left to rot on the field as it was barely profitable to harvest and sell it for the export market.

For overall economic growth purposes, the import parity price is essential, as if it were low enough, international trade could break the dependency to start growth in a balanced way with agriculture to keep real wages relatively low. The import parity price has consistently been above \$200 per tonne, and went up much higher in recent years, showing the need to keep up cereal production to keep food prices low (in the case of Ethiopia also helped by substantial food aid). The most recent period showed domestic prices going well beyond import parity prices: imports could have reduced prices considerably, but macroeconomic derailment meant that the foreign exchange was not available to do so.

This figure illustrates well the dilemma faced by a landlocked country: as cereals are bulky and expensive to transport, they become essentially non-tradable commodities. The result is that cereal or staple production is essential for growth, and these countries are required to focus attention on its food supply. Increased land productivity is essential. Poverty reduction can come about as part of this process, although the movement of the marginal product of labour is then essential – and migration will have to be a feature of poverty reduction. Contrast this with resource rich economies, which are landlocked as well: growth in agriculture is important in diversification, and as a means of securing food supply to keep relative prices in check. But the burden on agriculture as the driver of growth is not present, while the resource wealth can be used for distributional purposes as well.



**Figure 1** Prices for maize 1998-2008



Technological progress in agriculture has to be actively pursued, as well as other measures to raise rural productivities as the main way of delivering growth. Rural and agricultural development is likely to be hardest here, as they are often agriculturally more vulnerable areas, but it is here where it has to be attempted with most vigour. In order to achieve poverty reduction, there are also likely to be important trade-offs between stimulating agriculture in the high potential areas (as likely to be required for growth) and promoting it in more marginal areas where poverty may be highest. With commodity prices high, as in recent years, this tension between growth and poverty is even more present, as promoting overall agricultural output becomes even more crucial.

The contrast between, say Ethiopia and India, is striking here. Ethiopia may have been trying to open up in recent years, but its neighbours that are better located have not been taking advantage of trade opportunities, and in general its relations with them are at best frosty (such as is the case with Somalia and Eritrea). This limits its options dramatically. At best it can create a basic infrastructure and create skills, but growth is likely to have to come via agriculture to encourage any systematic and persistent decline in rural poverty. Its population cannot take advantage of growth opportunities in neighbouring countries for the purposes of trade or even of migration.

India has pockets and even states that face similar constraints on local natural resources, and other problems, as does Ethiopia (for example, Bihar). But its economy is broadly integrated, and with some states taking advantage of its increased openness and location, growth externalities and employment opportunities provide options for these lagging states to at least take partial advantage of the overall

change, with some beneficial impacts on local poverty reduction (provided, unlike Bihar, that they manage the political economy of this process well).

In sum, depending on geography and economic conditions, the role of agriculture and food production in growth and poverty reduction is rather different. In resource-rich economies, it is a source of diversification, whereby profitable opportunities in agriculture just as in other sectors of the economy can be pursued via investing the wealth generated from natural resources. Governance and management of Dutch disease problems are key for this to materialize. Poverty reduction objectives can be pursued as well in the form of rural policies, such as investing in basic services. But the burden on agriculture as a source of growth is limited. Agriculture is just part of a potential package for diversification of activities, with direct poverty impacts potentially high on the agenda. In coastal economies, skill formation and managed migration ought to be key, as labour intensive manufacturing offer the main scope for growth and poverty reduction. Agriculture can be part of this strategy (including as a sector for export-oriented investment). But with a relatively high proportion of the population still in agriculture, the question to ask is how to ensure that any agricultural policy and investment in due course will contribute to having fewer farmers. Landlocked economies with difficult neighbours are more reminiscent of a closed dual economy, with agriculture often facing difficult agro-climatic conditions. Exporting labour would be a sensible policy here, but this is typically not policy as neighbours and others do not welcome them. Then, agriculture is key for starting growth, with a key role for food production, as basic staple production is an essential ingredient to keep food prices sufficiently low to allow accumulation in the urban economy. Agricultural investment is hardest here, with high costs and potentially relatively low returns, but essential for growth and poverty reduction. In the next section, we suggest some key research questions that follow from this agenda. Some issues have long been taken for granted, but could do with new work through another lense.

### 3. A Research Agenda and some Further Poorly Answered Questions

The previous section argued for a view on the role of agriculture in growth and poverty reduction that took into account the overall growth context. Stimulating agriculture may have a role in the different contexts, but the constraints on agricultural policy are different. There are nevertheless a number of generic issues that remain of value to research and document in all contexts. We identify four areas for further study in this paper: understanding the internal rural-urban migration process and the extent of integration in rural-urban labour markets; the evolution of transactions costs between rural and urban areas and any institutional changes in marketing relationships; the changing patterns of land utilization, including geographically; and finally, understanding the sources of land productivity growth in agriculture itself.

Broadly speaking, there are two competing models of migration. The Harris-Todaro model is consistent with migration in response to higher urban marginal returns to labour, with in equilibrium returns equalized in expectation between urban and rural areas (Harris and Todaro, 1970). The Rosenzweig-

Stark model is one of migration as part of a household risk management strategy, whereby remittances and insurance are the real drivers of migration (Stark and Bloom, 1985; Rosenzweig and Stark, 1989). Of course, they do not need to be inconsistent, although in the former the market will equalize returns, while in the latter case, household behaviour is such that welfare levels are equalized ex-post via remittances. It is striking that much of the literature on migration in Africa appears to focus on the latter process, with an emphasis on remittances (e.g. de la Briere et al. (2002)). However, to study migration as part of the economic transformation, the former process may well be most important.

For rural poverty reduction directly to take place as part of this process of migration, it is of relevance to study the extent to which rural-urban labour markets are integrated: are the marginal returns to labour in urban areas similar to those in rural areas? Recall that in the neoclassical dual economy model this is assumed but this is an empirical question. More in general, increasing our understanding of the drivers of migration is of value: who are the migrants and how do they compare to non-migrants. Furthermore, the study of the consequences of migration on migrants and non-migrants, including not just on welfare but also on the evolution of the labour productivity is of relevance.

Studying migration is rather difficult. In most data sets, we observe only migrants in the location to which they migrated (e.g. in a cross-section data set in an urban area), or families receiving remittances from a migrant that has left the family (e.g. in a cross-section data set of a rural area). If longitudinal household data are collected, then households are usually surveyed in their original location, and migrants are usually treated as attrition. As table 1 showed, it makes a huge difference for inference whether they are included or not. More generally, to properly assess the evolution and relationship of marginal productivity and earnings in different settings, linked to migration, observing migrants in their destination as well as non-migrants in the original location is necessary. Such data or sensible substitutes are often not available.

A second key issue is the study of the evolution of transactions costs in the movement of goods, not least agricultural commodities, between rural and urban areas. The comparative advantage of agriculture in any growth strategy as discussed above crucially depends on the costs of moving goods around and between rural and urban areas. For example, the returns to generating any marketed surplus to crop production depend on the share paid to farmers, in turn determining their scope for investment in skills to contribute to the agricultural transformation. Transport and marketing costs also crucially affect the gap between import and export parity prices and the extent to which food production is a constraint on growth and real wages.

In the last few decades, and not least financed by lavish aid budgets, road infrastructure in Africa has increased considerably. With liberalization of markets in many countries, it will be of interest to study the changes in the transactions costs. For example, in Ethiopia, between 2002 and 2008, transactions costs, as measured by the difference in urban wholesale prices and rural prices, stayed roughly the same despite large investments in roads, although the increase in fuel costs may well have offset any advantages (Dercon and Vargas Hill, 2009). Note that this issue is rather different from the study of market integration, which studies whether and the speed at which prices between different locations

adjust to information on shocks in demand or supply in either location, for a given marketing margin. Most recent evidence appears to suggest that markets in most countries are reasonably fast adjusting, and in any case faster than they used to. Here, the concern is with the marketing margin itself.

Related, the basis for the evolution of transactions costs should be better understood. Have marketing relationships changed? Are trading relationships transforming? Are there economies of scale? In the context of Asia and Latin America, much innovation in retail-wholesale links has been reported, not least via supermarkets and other forms of vertical integration (Reardon, et al.xxx). In some African countries, similar processes are taking place and the more detailed study of these institutional changes and the way they affect marketing costs is of relevance.

A third area deserving attention to study nascent forms of transformation is a careful study of the change of land utilization, cropping patterns and intensification (e.g. in terms of modern input use) in recent decades. What is the crop composition? Are more high value crops being grown? How are yields (i.e. land productivity) evolving? How is average labour productivity in agriculture evolving? Of specific interest are the geographical patterns, in response to market liberalization and the changing spatial incentives. In principle, with market liberalization, supply is likely to have shifted nearer to towns, as prices would have become more strongly determined by access to markets. Horticultural expansion and a move to higher value crops is also likely to have happened nearer demand or good transport areas, with important implications for the patterns of rural poverty as well.

Of course, even within particular locations, not all will have been able to take advantage of incentives, and careful studies of the differential yields and labour productivity obtained by different farmers within similar localities is also of interest to understand how agricultural change feeds into poverty. In Dercon (2009) a detailed discussion is offered on how key certain key market failures, related to credit constraints, risk and geographical externalities linked to remoteness may ensure that otherwise similar households may get rather different returns to the same type of activities, or have differential access to activities. Land and labour productivity are the relevant indicators to compare.

Finally, no discussion on the potential role of agriculture in growth makes sense unless there is a real scope for substantial productivity growth. This has two dimensions: the sources of productivity growth and the process of adoption. It is typically taken for granted that the problem of African agriculture is one of intensification using existing technology packages and extension: the assumption is that such scope for productivity improvements exist and are profitable to farmers. In short, it is suggested that a 'green revolution for Africa' is around the corner. It is suggested that both technologies have been developed, and at least as importantly, have been adapted to the local agro-climatic circumstances (an essential part of the technology development).

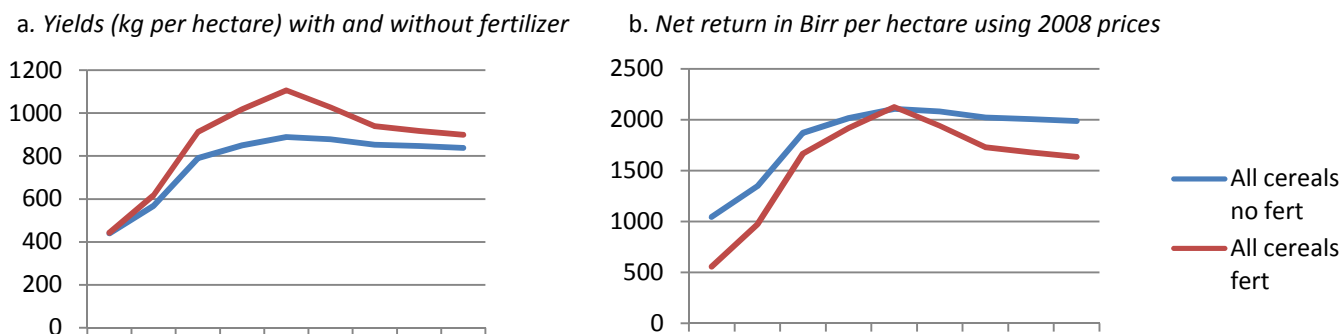
It is in fact increasingly clear that this may well be another fallacy. In terms of high yielding improved or hybrid seeds, little is in practice available of the scale that was available during the Green Revolution in Asia. In India and Southeast Asia, it deserves its name not least because of the massive yield gains that were on offer by using new varieties. Wheat technologies developed at CIMMYT, with suitable

complementary inputs, offered a more than fivefold increase in yields on small farmer demonstration plots in India (Swaminathan, 2006). Rice yields on offer via IR8 rice were early on estimated to be 5 times the traditional variety using traditional methods and 10 times using optimal input packages (De Datta et al., 1968). For Africa, little on this scale is available (Otsuka and Kalirajan, 2006). The possible exception is dryland rice, but even there much work needs to be done and it is not suitable for many if not most settings in Africa. For crops such as sorghum or millet, only limited progress has been made. Wheat success elsewhere is hard to transfer, and much work needs to be done on local adaptation. For maize, much success has been claimed, not least in East Africa, in countries such as Malawi, Ethiopia and Kenya (Otsuka and Yamano, 2007). However, on-farm controlled trials rarely suggest yield improvements beyond about doubling yield, when combined with improved practices and fertilizer. This may seem a lot, but it should never be forgotten that despite the massive gains available in terms of Green Revolution technologies, it took countries such as India a decade to double cereal yields. Different factors played a role in that, but generically, as adoption processes are slow and risky (with incentives for farmers to wait until others are seen to be successful), while under actual farm conditions and due to minor variations in agroclimatic conditions, on-farm controlled trial yields are not easily replicated across wider areas. One remarkable shortcoming of the economic discussion of the scope for land productivity gains is a reluctance to carefully examine the agricultural scientific literature, not least the reported and peer-reviewed controlled trials related to seeds and other technologies. One useful area of research would be to consolidate this existing literature for each country to assess the scope available.

Seeds may not be available, but most attention has been paid to the role of fertilizer in increasing productivity. In Malawi, for example, it became the cornerstone for 'green revolution' policy. It should however not be forgotten that for many farmers in many corners, fertilizer may offer substantially higher yields, but is not necessarily profitable. Suri (2008) for example documented this for Kenya; Dercon and Christiaensen (2006) offer evidence for Ethiopia. Whether this is true for other countries would need to be assessed, but the evidence in figure 2 is striking. It gives the yields for an average farmer in the Ethiopian Rural Household Survey, a large household survey covering different agro-climatic zones. For different levels of rainfall, simulated production function estimates suggest strong yield gains (on average 24%) from using fertilizer (figure a), but it is not profitable on average (figure b). In this context, about 40 percent of farmers were using fertilizer, presumably profitably, but not for the average farmer, so that expanding further is unlikely to take place. Again, assessing this carefully for different contexts is relevant.

**Figure 2: Yields and returns to fertilizer use in Ethiopia**

Using data from Dercon and Christiaensen (2007) on crop yields with and without fertilizer at different deciles of rainfall (estimated using ERHS 1999)



Even if technology packages are available, understanding better the constraints on adoption is still required to understand the constraints on productivity growth, but also their distributional consequences in rural settings. Some of the key questions are: How do farmers learn? Which farmers learn faster? Are extension processes effective? Do farmers learn from each other (Bandiera and Rasul, 2006)? Is there any interaction between smallholder and more commercial forms of agriculture? Are subgrower (contract farming) schemes effective means of transmitting information on farming?

It does lead to a final related issue. Policy makers and NGOs have long been advocating that smallholder agriculture is going to be source of high productivity growth in agriculture. All attention in terms of adoption of modern inputs, extension, input provision and market access tends to go to them, as an unquestionable model of agriculture. Peasant farming is idealized as reflecting the true entrepreneurial spirit of development. This is sensible, and views of peasant agriculture as backward and ignorant have never done development and poverty reduction any good. But idealizing the peasant farmers ignores that they are the ones we have to strive to get out of agriculture: many of the current 'entrepreneurial, innovative, hyperrational' peasants are the low skilled manufacturing worker of tomorrow, earning higher and more secure wages than their meager incomes before. Other organizational forms of agriculture should then also not be dismissed. While there are no scale economies in peasant agriculture (as the large number of studies of the inverse productivity relationship in peasant settings have confirmed), this does not mean that when totally different technologies and production processes are used, some scale economies cannot be found. Commercial larger scale farming often finds economies of scale in storage, packaging, marketing, and transport of produce, and other processes of vertical integration. Peasant agriculture may be able to exploit them as well such as via cooperatives and contract farming, but not necessarily more efficiently in principle. It does suggest a fertile area of research, in which some further conventional wisdom may well need to be challenged.

## Conclusion

Should agriculture and especially food crop production be promoted as the key source for growth and poverty reduction? This paper has argued that standard views on this matter contain plenty of fallacies and half-truths. We argue that agriculture is best understood as a sector involving too large a population, and in need to become smaller relative to other sectors in order to feed growth and reduce poverty. How this can come about is of course the key question. We argue that whether agricultural growth is essential in this process depends on the context. In a theoretical setting, using the dual economy model, we argue that it depends on whether the context justifies certain assumptions or not, related to openness and the functioning of markets, especially labour markets and the links between the urban and rural economies.

For the case of Africa, three cases are highlighted, based on the classification by Ndulu et al. (2008). In one set of countries, coastal with opportunities to engage in the world economy via trade, agriculture is not a key sector for food supply, but it has a key role in feeding the structural transformation in agriculture and the reduction of labour engaged in that sector. Investing in skill formation is likely to be most relevant for rural policy; agricultural opportunities should be taken but for growth, agriculture should not be made the key sector. In resource-rich economies, agriculture could be a useful source for diversification of the economy, investing the natural resource wealth. Furthermore, rural policy could take a stronger distributional role, but agriculture is not burdened by being the key source of growth. Contrary to these three cases, in landlocked resource-poor countries with poor neighbours, staples are effectively non-tradable goods, but essential. Food production is crucial to feed any growth process, and agriculture is a priority for growth and to start a process of poverty reduction. Nevertheless, growth objectives are likely to dominate, making investment in high potential areas a relative priority over distributional arguments.

The exact relevance of each of these arguments for particular countries will need to be investigated further. But it does offer a framework to critically examine current policy strategies and a means to assess how agriculture is doing in particular countries. In terms of a specific research agenda, we identify four areas that are definitely worth exploring further. First, we could definitely do with an increased understanding of migration and the nature of urban-rural labour market linkages. Secondly, we should assess more carefully how output markets, not least for food, have been evolving over time, specifically in terms of the transactions costs of moving produce from rural areas to the areas of demand. Thirdly, the changing patterns of land utilization, cropping patterns and the intensification of agriculture should be carefully documented. Key variables of attention are labour and land productivity. Finally, the scope for productivity growth needs to be assessed, not least as the idea of a green revolution for Africa is unlikely to have the evidence base that is sometimes claimed to be had.

## Appendix: a verbal exposition of Eswaran and Kotwal (1993)

Eswaran and Kotwal's analysis can be thought of as a Lewis model within a proper general equilibrium framework. It also drops some of the most difficult assumptions underlying Lewis's original analysis, but which have remained present in many of the subsequent contributions. To put it bluntly, there is no assumption that rural labour markets work in a way equivalent to agricultural workers spending too much time sitting under trees (surplus labour that can be freely extracted). Furthermore, industrial workers do not choose to eat shirts during a critical phase of the growth process (that is, when total output in agriculture is going down, they are willing to shift to consuming less food and more manufacturing goods).<sup>5</sup>

The Eswaran and Kotwal model assumes a two-sector economy, industry, and agriculture. There are two goods: shirts and food. Production in both sectors is characterized by (different) constant returns to scale production technology, using labour as well as land in agriculture. There are landowners and workers in the rural economy, and workers in the industrial sector. A crucial assumption is that preferences are lexicographic: people will first need to have enough food before they will buy shirts. It captures an Engel effect that richer people will spend less on basic essentials, but, by making it more in agextreme, its relevance comes out more directly. An alternative way of looking at this is to state that there is no circumstance in which, for very poor people, lower prices for manufactured goods cannot induce them to cut back on essential basic commodities. Even though in reality it may not be as clear-cut, this view takes seriously that poverty is related to deprivation in essential food intake. As EW show, relaxing the assumptions does not fundamentally change the result, but it does make the dichotomy in implications under different processes of technological and other development marginally less striking. There is also an initial inequality in this economy. Some (the rich) have assets such as land; the poor only have labour. At first, the poor only eat food, since they do not have enough to satisfy their basic needs; once satiated with food, they do not eat more. So there is a maximum level of spending on food, and a poor person is someone who only spends on food.

It is further assumed that there are clearing and integrated labour markets across rural and urban areas.<sup>6</sup> This means that people are indifferent as to whether they work in agriculture or industry: contrary to Lewis, these markets are not perfectly segmented, but integrated.<sup>7</sup> Clearing product markets are those where demand equals supply in each. All these assumptions about markets imply that poverty

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<sup>5</sup> For an excellent exposition of the Lewis model, see Ray (1998).

<sup>6</sup> This assumption concerning perfect factor markets is crucial. Although offering a rather different model from the one discussed here, Jorgensen (1961) can be seen as a predecessor, as he also brought in neoclassical market clearing assumptions and issues related to food consumption as a way of characterizing his 'dual economy' model. Ranis and Fei (1964) can be credited with offering some of the general equilibrium analysis presented in EW as well, including the impact of trade, although they used a dual economy setting rather than competitive factor markets.

<sup>7</sup> This assumption can be questioned. However, as one purpose of this framework is to explain why in some contexts, it may not be crucial to focus on agriculture to get growth and poverty reduction, this assumption actually biases our arguments in favour of a focus on agriculture, as surplus labour implies that labour can be taken out of agriculture into the urban sector without any impact on total food supply.



will go down if labour demand increases, resulting in an increase of real wages. In other words, real wage increases for the initially poor determine whether poverty declines. But how does this work? Using the assumptions, a generic model can be developed that can be used to contrast a number of alternative strategies to achieve this. Understanding the context and situation in which these different strategies are effective ways of reducing poverty will also help us to understand how important it is to focus on agricultural and rural development.

First, in a closed economy, the policy to be considered is (neutral) industrial progress via total factor productivity (TFP) growth. Under these assumptions, Eswaran and Kotwal show that this implies that more shirts are being produced for the same amount of labour. Prices for shirts will go down, but crucially the poor do not care for these cheaper shirts, since they still do not have enough food. The result is that there is no incentive for anyone to move out of agriculture, since total food supply would go down and demand for food would go up. In the end, the TFP growth only benefits the rich, who have enough food and are already consuming shirts, which they can consume more of. The marginal product of labour in industry goes up, but the price of shirts goes down. Employment is unchanged, and nominal wages, food prices, and therefore real wages for the poor are the same as before. Poverty is simply unchanged, despite TFP growth in the industrial sector.

Next, consider again a closed economy and a policy of (neutral) technological progress in agriculture. More food is being produced for the same labour. This is obviously of interest to all the workers: there is more food for the same amount of work. Once there is more food consumed, some may cross the threshold and be satiated with food, and become interested in buying shirts. The result is that shirt prices are being pushed up. This creates incentives for firms to expand production and attract more labour to deliver this increased production. Higher demand for labour will require increasing nominal wages. Rural wages will move up as well, while food prices will go down somewhat, due to the higher production and shift to shirts by some previously poor consumers. In equilibrium, labour will have moved out of agriculture into shirt production, and higher equilibrium real wages will imply a reduction in poverty. The contrasting results are striking and lead to the conclusion that, in a closed economy, growth in agriculture may well be essential for poverty reduction, while industrial progress has no impact. The presence of demand linkages is the key factor, but, for poverty reduction, the relevant linkages are only via commodities consumed by the poor. Mellor has long emphasized this process as well (1999). But there is a difference here: the issue is not just growth linkages but also the link with poverty. Agriculture is then the central engine for poverty-reducing growth.

The results are nevertheless strongly affected by the assumptions about openness. In an open economy, the central demand and supply constraints do not matter anymore for traded commodities. Basic food staples can typically be imported, while shirts can be exported. Therefore, assume that both goods are tradable goods, so that only world prices matter.

We can now revisit both cases. First, consider the impact of industrial progress. More shirts are being produced for the same labour input, but prices of shirts remain the same, as world prices are not affected. Firms have an incentive to expand production, so the demand for labour and nominal wages

will increase. Even though food supply goes down, in this case workers can move since food imports can go up. So the marginal product of labour goes up in agriculture as well, allowing rural and urban wages to increase in nominal and real terms. Food imports with higher real wages will mean that more food is being consumed and that some workers will start consuming shirts. The result is that poverty declines. Second, the impact of agricultural technological progress is now very similar to industrial progress. The demand linkages are not crucial anymore for the link between real wages and output, and real wages increase with more people buying shirts than before.

To put it simply, poverty reduction can then be achieved by any source of increased domestic competitiveness relative to the rest of the world, a fundamentally different result to the case of a closed economy. It also creates other vulnerabilities: one's trading partner's productivity growth and any loss of relative competitiveness ("dynamic comparative advantage") could have negative implications in terms of poverty (that is, it has the effects of industrial or agricultural decline). Keeping up, or more generally being able to grow faster in productivity terms than your trading partners, is essential. Eswaran and Kotwal, writing near the time of the first moves towards openness in the early 1990s, argue strongly that the evidence is supportive of much potential for India in this respect, especially in growth via technological progress in industry, and that an open trade model could assist poverty reduction, even if direct progress in agriculture and the rural sector remained limited. At the same time, technological progress in agriculture has a useful role to play.

Even though the analysis may seem relatively simple, it helps to illustrate some central insights. First, in any scenario, the defining feature of poverty alleviation appears to be linked to the gradual absorption of labour by the non-agricultural sector. There is nothing specific about rural poverty, beyond that it is typically a sign of slow growth. But it goes beyond this: it may also be a sign of the "wrong" growth forces. Second, to understand the role of the agricultural sector in poverty alleviation, it is important to take into account openness. If the economy is closed, the pattern of growth is crucially important for poverty alleviation. In particular, agricultural growth can then deliver poverty reduction and, given demand linkages, more straightforwardly than industrial progress. In an open economy this is not necessarily the case. Indeed, the emerging context of globalization changes the dynamic of our understanding of the role of agriculture: it offers more opportunities even though its pitfalls and risks will also need to be properly understood. Third, introducing more heterogeneity in labour, production technology, and sectors does not change the underlying logic (Eswaran and Kotwal 1993). However, if technological progress is not "neutral" or labour intensive, but instead is less labour intensive, then the model would predict a far lower impact on poverty reduction, since labour demand and real wage increases would be more limited. Eswaran and Kotwal (2002) extended the model further with the introduction of a service sector and non-tradable goods—the interactions are more subtle but not undermining the main insights.

What does this imply for the importance of agricultural growth? In general, it could play a useful role: in many contexts it may be a most suitable mechanism for poverty reduction. However, one should be careful. Technological progress in agriculture can be thought of as involving the discrete adoption of new inputs, such as new varieties, fertilizers, or pesticides. It involves some unpleasant arithmetic: much

progress in agriculture itself is a “once and for all” change. For example, fertilizer adoption may well add about 20 percent higher returns to particular crops, but this does not in itself lead to a persistent year-on-year growth in yields. Any growth effect will largely depend on the presence of very substantial linkages. Some have argued that these linkages are very large in developing countries (for example Mellor 1999), although, as has been argued before, this is largely based on evidence from particular countries using particular methodologies, such as computable general equilibrium models, which are dependent on strong behavioral assumptions.

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