Renaissance Capital

African agriculture

This other Eden

Agriculture
Global emerging markets

Sector report
Equity Research

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- **African agriculture is likely to be transformed over the next two decades,** and mirror the Brazilian experience over the previous two decades. Urbanisation, the advent of the superfarm, a lack of legacy structures and a desire for food security; plus new thinking on aid, sustainability and investment models, will play a major part in changing the continent from one dominated by smallholders to one at the cutting-edge of agriculture practice.
- **Unlocking Africa's potential.** Africa is part of the vital Brazil-Africa-China (BAC) axis, which represents a major geostrategic triangle in global agriculture. The food needs of China (among other industrialising markets) cannot be met by Brazil (among other countries in the Americas). The completion of this BAC axis is essential for global food security.
- **Food security.** The underutilised resource that is Africa's Guinea Savannah accounts for 400mn ha of possible land for farming. Given the UN Food and Agriculture Organisation's (FAO) belief that only 70mn ha of additional land is required to feed the world's 9bn people by 2050, this represents a major opportunity for Africa to provide for its own food security needs, and possibly those of other parts of the world.
- **Urbanisation.** An urbanising Africa has given the continent a structural food deficit approaching $30bn pa. We believe Africa's domestic food needs, its burgeoning urban population and the capital-labour trade-off will transform the outlook for the agriculture sector in the year head.
- **Superfarms.** Industrial agriculture is inevitable. Africa has no legacy structures in agriculture, and we believe it could leapfrog other parts of the world in advanced farming techniques, such as precision farming, no-till farming and aerial mapping. The idea that large-scale farms are uneconomic is unfounded.
- **Sustainability.** The collapse of food-supply systems that support urban societies has been a permanent issue since urban centres were founded. We expect a great deal of new thinking on sustainability in agriculture, and expect Africa to lead much of that new thinking.
- **Resource nationalism.** Often associated with the extractive industries, we should expect urbanisation, very large-scale human migration patterns, the advent of superfarms and political populists to combine, bringing resource nationalism to the fore in African agriculture.
- **The future of aid.** African food aid will likely be transformed, too. The idea that some aid agencies are seeking to transform themselves into commercial enterprises highlights the new thinking that abounds in Africa. We expect traditional methods of delivering aid to become redundant in the decades ahead.
- **Runners, riders and the open field.** In our view, the investors, opportunities and structures that will come to dominate the African agricultural landscape are as varied as the industrial equivalents that transformed the Chinese economy throughout the 1980s and 1990s.

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This other Eden; demi-paradise, This fortress built by Nature for herself – William Shakespeare (*King Richard II*)

On Saturday I was a surgeon in Africa, very little known. On Monday, I was world renowned – Christiaan Barnard

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No doubt nationalism and patriotism possess some merits, not least their propensity to bind diffuse groups of people together. But among their faults, one that seems to pass without comment is the tendency of the nationalist and the patriot to view cultures, peoples and places as a constant. The tendency of these ideologies is to view the past as unremittingly positive, or consistently unfair – and for that to be a permanent feature of the landscape. In other words, nationalism requires an unswerving narrative if it is to have any meaning at all.

But if painting a positive picture of history, or creating victim status out of the past, requires an unwavering account of a nation's history, then it implies two things: first, that vast tracts of nations' histories have to be ignored or discounted as aberrations; second, that the past will always be a reflection of the future – when empirically this has rarely been the case.

In an Africa-wide context, this unbending mindset has huge implications. For the best part of four decades, the perception of Africa has been one of unremitting gloom, cloaked in negative images and lazily assembled into a wretched narrative by the world's media.

For many commentators it is easy enough to look at the past four decades and assume this is a fair reflection of the next four decades. Clearly, the evidence could suggest the reverse. We could choose to ignore the fact that China – a rounding error in the world economy in the 1980s – would become the world's largest creditor, with a $3trn foreign exchange reserve, in the space of a generation. We might also have convinced ourselves that South Korea was destined to remain an impoverished, insular, mountainous agrarian state and ignored the inconvenient fact that it is now the seventh-biggest exporting country on the planet – an achievement that took place over a 40-year period. And, on a more mundane level, which Briton over the age of 40 recognises the country of the Edwardian children's fiction they read when they were young?

In short, history rarely provides a continuous narrative, hence the perception of Africa has to change. If the above examples demonstrate some kind of irony, the greatest irony of all is surely the possibility not of Africa feeding itself, but of Africa becoming a major supplier to world food markets in the decades ahead. We are insufficiently naïve to grab hold of the recently minted mantra of Africa feeding the world. No doubt this notion – tantalising as it may sound – will evolve and lapse rapidly into an investment cliché. That said, we believe the opportunities and possibilities for the African agriculture sector in the decades ahead are considerable.

The starting points for this report, however, are not in Africa but to the west in Brazil and to the east in China. Let us call these three areas the BAC axis; and let's start in Brazil.

Brazil-Africa-China: The BAC axis

The comparison between Brazil and Africa is an increasingly common feature of analysis across the agriculture sector; and we agree with many of the comparisons drawn between the two. The breadth of Brazil's topography, geography and climate is broadly similar to many parts of Africa and the potential that one sees across the Guinea Savannah is similar to the potential unlocked in Brazil's Cerrado in recent decades.

Yet look at the backdrop. In the early 1960s, the Cerrado region of Brazil had limited agricultural potential. Fertility was low, the soil was highly acidic, infrastructure was poor and there were no large urban centres nearby. The South and South Eastern regions were the dominant centres of agricultural production. In short, much of Brazil was an agricultural backwater and far removed from the agricultural superpower it has become in the intervening decades.

Change began in the late 1960s. The Brazilian government instituted policies to "colonise" the Cerrado, encouraging migration into the sparsely populated region. Many agricultural entrepreneurs from the Southern regions, attracted by the availability of large tracts of land at a relatively low price, took their investment and farming knowledge with them. Government support included subsidised inputs, credit, price supports and tax incentives.

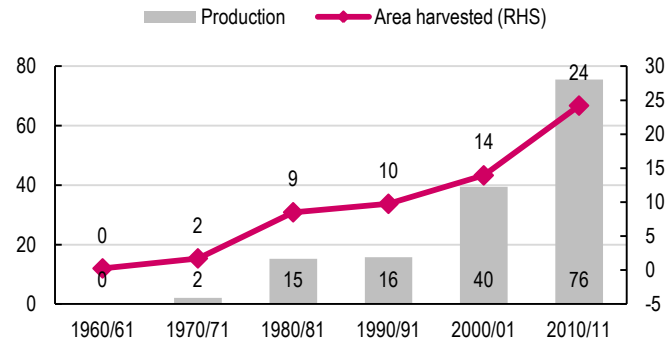
The national agricultural research organisation, Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), established in 1973, had a leading role to play in the transformation of the Cerrado. EMBRAPA employed an integrated strategy to raise productivity, through initiatives such as adding lime to neutralise soil acidity, developing high-yielding soybean varieties and the implementation of appropriate farming practices.

To appreciate EMBRAPA's role, consider the fact that soybean is a crop native to East Asia and grows best in a temperate climate. EMBRAPA developed varieties of soybeans that could grow in the tropical climate of the Cerrado. Similarly, it also bred varieties of nitrogen-fixing bacteria that work best in the Cerrado's soils, reducing the need for fertilisers. To encourage animal husbandry, EMBRAPA developed grass varieties that give higher yields in the Cerrado and designed appropriate livestock management techniques.

The next major impetus to agricultural investment in the Cerrado came in the 1990s. The introduction of the Real Economic Stabilisation Plan in 1994 stabilised the economy and reduced inflation. However, at the beginning of 1999, Brazil adopted a floating exchange rate and the currency suffered a significant devaluation: this brought major benefits to the agricultural sector, as it made Brazilian exports competitive in the global market. Over the same period, the government enacted reforms that improved the investment climate and allowed the private sector to flourish.

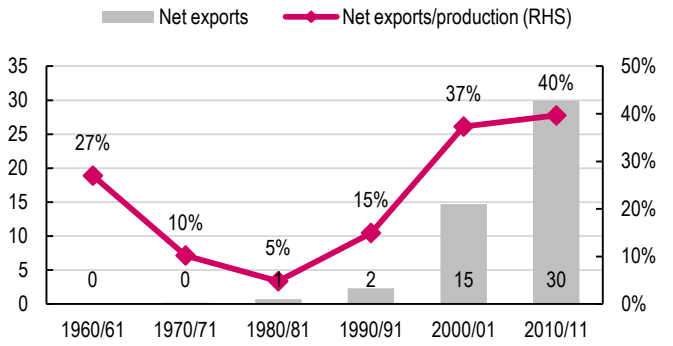
Together, these measures transformed the Cerrado into a dominant agricultural producer. The region accounts for the bulk of Brazil's production of soybeans, sorghum, coffee and beef, and a major proportion of Brazil's production of corn and rice. Figures 1-4 illustrate Brazil's transformation over the past five decades in soybeans and beef – two commodities for which the contribution of the Cerrado is substantial.

Figure 1: Soybeans – area harvested (mn ha) and production, mnt



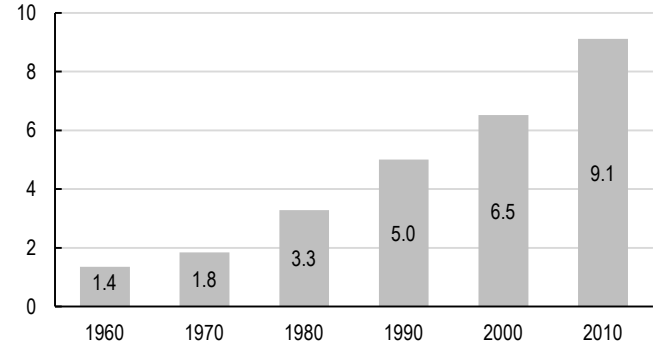
Source: FAO, USDA

Figure 2: Soybeans – net exports (mnt) and net exports/production, %



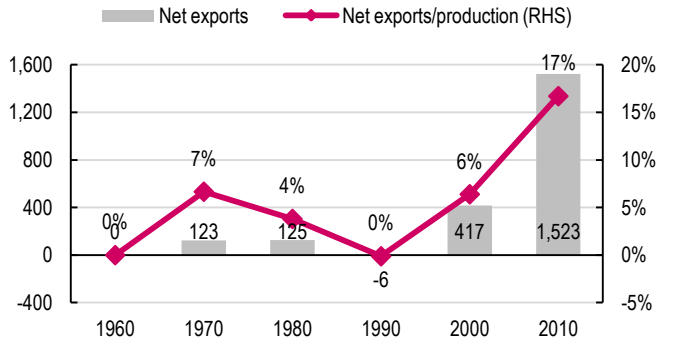
Source: FAO, USDA

Figure 3: Beef and veal production, mnt



Source: USDA

Figure 4: Beef and veal – net exports (kt) and net exports/production, %



Source: USDA

The favourable government policies, focus on agricultural technology and migration of skilled farmers that successfully opened up the Cerrado are mostly supply-side factors. Can Africa replicate this success? We explore this issue in the next chapter *Unlocking Africa's potential* where we look at the Brazilian case study, in detail, given its direct relevance to Africa.

We draw two conclusions here:

First, the successful development of the Cerrado depended on many factors – some driven by government, some by private capital. Both these elements were critical to the success of the venture, and slavish adherents to either cannot claim any ideological prize. We would go as far to say that the military dictatorship that governed Brazil between 1964 and 1985 was an essential component in the transformation of this hinterland. Thus, an uncomfortable truth lies behind a mask of success and corporate respectability.

Our second conclusion, and another uncomfortable truth, is that the Cerrado took four decades to become a byword for agricultural achievement in Latin America. Certainly, the empowering impact of communications technology, coupled with the thrust of globalisation, should enable 40 years to be compressed into a shorter timeframe for Africa; but we acknowledge that there are few shortcuts available in agriculture generally, and Africa in particular.

Thus, while the successful Brazil case study forms our template for African agriculture, we cannot view the supply side in isolation. We have to shift eastwards towards China and look at the demand side of the equation. China might not be the only emerging market but its changing dietary requirements and strategic food needs have global implications, and represent a broad trend across the planet.

China's shift towards a more protein-based diet is forcing the country into greater dependence on yet another raw material import, soybeans. Consider that China imported 10mnt of soybeans in 2001 and by 2011 was importing over 72mnt of the stuff. Note that over the same period, Brazil's soybean output rose from 39mnt to 75mnt and its exports rose from 15mnt to almost 30mnt. Therefore, a large part of Brazil's development across the Cerrado was driven by Chinese demand growth (Argentina and the US also experienced similar levels of export-demand growth).

There is a critical issue at play here – one that requires some explanation: ignoring palm oil which is wholly imported, there are four major grains and oilseeds central to the Chinese landscape: soybeans, corn, wheat and rice. Broadly speaking, soybeans are used as a feedstock for poultry while corn is used as a feedstock for pork. Rice and wheat are used for human consumption. Meanwhile, 75% of the Chinese protein intake is pork-based, while the remaining 25% can be attributed to either poultry or beef.

Therefore – and we acknowledge this is a slight generalisation – we conclude that soybeans are the least strategic of these four grains and oilseeds while rice and wheat are wholly strategic. In other words, China gave up having its own strategic supply of soybeans decades back. However, for rice and wheat, China has managed to increase its yields as well as increasing the planted area for these crops, underlining the country's strategic desire to ensure a strategic supply of these two grains.

Corn lies awkwardly somewhere between non-strategic and strategic. Although it is predominantly used as a feedstock, it is a feedstock for that protein sub-sector which is growing the most rapidly and accounts for the bulk of consumption. In a later section we go into the detail of this shift in some detail. However, a bald fact emerges: if China wishes to remain self-sufficient in rice and wheat, it is highly likely to become a major importer of corn in the years ahead. Within the past few weeks China has finally acknowledged that corn imports are going to rise sharply in the years ahead. Bunge's decision not to contaminate its elevators with corn grown using Syngenta's *Agrisure Viptera* seed was an early signal that it foresaw a boom in exports of North American corn to China in the years ahead, and did not want to risk a ban.

Food security

Food security has become one of the most prominent geostrategic themes in recent years. Type the words into Google and within 0.13 seconds, you will have 78mn references on the subject. The implications of food security are not just an African issue but also an issue for every other part of the planet. Thus food security in a resource-rich continent like Africa has a dual effect: how does the continent seek to reduce its near $30bn structural trade deficit in food and also become a net exporter to the likes of China. We take an in-depth look at food security later in this document

and focus on what it means on a global scale. Moreover, we look at the implications for food supply in a world getting more populated, richer and more inclined to use crops for fuel. We also look at the potential supply-side possibilities for raising basic yields to a level where food security is increased.

However, the issue of food security is not only about basic needs and how to fulfil those needs – it is also about the risks attached to achieving it. And that is where Africa becomes pivotal in terms of risk diversification. In common with the oil & gas industry, there comes a point where an over-reliance on too few suppliers for a country's energy security needs makes it hunt out alternative sources of energy. A similar need to diversify supply will likely arise in agriculture and this will likely have big implications for Africa.

Brazil remains an obvious option. Bear in mind, that the FAO reckons the planet only requires an extra 70mn ha of agricultural land to supply the additional food needs of the anticipated 9bn people on the planet by 2050. In other words, the Americas could most likely fulfil this need alone with Canada, the US, Brazil and Argentina providing the bulk of additional supply.

However, note what we said about the need for *alternative* supplies in the energy sector. Clearly, the potential of the Cerrado remains significant given its vast untapped hinterlands, which could be brought in to supply the strategic needs of many large-scale markets with pressing food security needs. However, an over-reliance on too few sources of supply in basic soft commodities is not a decision to be taken lightly.

What does not help is the fact that another untapped source of long-term supply ought to be Russia. Nevertheless, Russia's port bottlenecks are entrenched. It might be reasonable to say that opening up new sources of supply within Russia will prove equally challenging to opening up the vast acreage of the Guinea Savannah. Consider that since the early 1990s and the initial Gaidar reforms, some 40mn ha of Russian agricultural farmland has gone out of production. Consider that those lands could produce some 120mn tpa of crops. Then consider the fact that Russia's Black Sea Ports can only handle 25mn tpa of grain exports. That gives you an indication of how Russia's long-term potential could go untapped for many years yet.

We look at this issue in more depth in the sections of this report on *Food security* and *Resource nationalism*. A broad conclusion we draw from the demand side of the equation is that the development of Brazilian agriculture in the past 20 years has largely been driven by growth in emerging markets, especially China. Ultimately, Africa has to be opened up to international trade in agriculture if the planet wishes to avoid food scares and an underlying additional threat to stable prices. It really is that simple.

Resource nationalism

Resource nationalism is a fairly straightforward concept to understand. At its most fundamental level, what drives resource nationalism is that at some point in a country's history, colonists and foreigners turn up on your doorstep and grab an asset – usually, but not always, a mineral resource, and frequently something to which the colonised attributed little value before the foreigners arrived. The modern

version of this practice does not necessarily require ownership of the asset; it can be activated in situations where foreigners dominate purchase of the output.

In its crudest terms, resource nationalism comes into play when an anti-colonial backlash takes effect. Thus the post-colonial era, which had its roots in the 1920s and 1930s but flourished from the mid-1950s onwards, prompted a wave of resource nationalism from Persian oil in the 1930s right up to the modern day where we are beginning to see a backlash against Chinese investment in the Zambian copper belt through the election of the Sata government.

However, resource nationalism is not entirely driven by anti-foreign sentiment. High prices help, too. It is no accident that some of the most egregious examples of resource nationalism arise when prices are high. The electoral success of Evo Morales in Bolivia, Hugo Chávez in Venezuela and the Sata government in Zambia might never have materialised had it not been for the prevailing high prices of oil, gas and copper over the past decade.

Resource nationalism in agriculture mirrors the experience of industrial agriculture itself – that is, it exists, but it is far from the norm. It is becoming an increasingly central theme of the sector, is not without controversy and is not widely understood within the investment community. However resource nationalism in agriculture has a long pedigree. In 1529, a Portuguese trader, Captain Garcia, after a costly attempt to build a fort and subjugate the robust population of the Banda Islands, decided that buying nutmeg and mace from traders in Malacca was a much better idea than trying to colonise the forceful Islanders themselves. Hard as it might be to believe, in the 16th century, nutmeg had a similar influence to that exerted by the oil industry today.

The internationalisation of trade, high prices for agricultural goods, the need to secure alternative food supplies and the sensitivities of access to and ownership of land all suggest resource nationalism in agriculture is likely to become a more prominent theme in the years ahead. Indeed, we note a metaphorical straight line of history from the Banda Islands in the 16th century right through to modern-day Zimbabwe and South Africa. We look at this theme later in this report, and conclude that while resource nationalism appears to be a straightforward issue to understand, whether in the extractive industries or in agriculture, it is becoming an increasingly complex issue that now has to encompass sustainable development, climate change and poverty reduction.

A final observation, which adds to the complexity, is the fact that unlike the mining and oil industries, agriculture is fragmented. Thus the practice of resource nationalism in agriculture is likely to play out differently in contrast to the experience of the other sectors noted.

Urbanisation as the crucible of growth

We have noted in previous research our view that the city and urbanisation are shorthand for communication, and how easily we revert towards romantic notions of the rural idyll vs the ghastly complexities of cities. You do not need to be French to revel in the notion of *la patrimoine*; English to understand the notion of a green and

pleasant land; or Chinese to see clan, kinship and countryside as a trinity of identity. For many, the countryside has cultural roots that run deep.

But people move to cities in vast numbers because they represent progress. Africa's bricolage cities may look like a modern vision of awfulness, but they certainly don't feel like it. In fact we would go as far to say that creativity in Paris is more likely threatened by the fact that the place feels more like a museum than a cultural crucible. That is not something anyone can say about Nairobi or Lagos.

The "idiocy of rural life" attributed to Karl Marx would seem to support our argument that cities represent progress in contrast to rural constituencies. In truth, the English version of Marx is mistranslated from the original German and a more accurate reflection of the word *idiotismus* is separation, i.e., the notion that rural life brings isolation in its wake. Thus isolation stifles innovation while the city is a place of revolutions. However, the key point – and we address this later – is that cities are not only the focal point of revolutions, change and innovation; they also force concomitant change on the countryside because isolation is no longer tenable.

Like most things in life the twin issues of urbanisation vs rural separation are somewhat more complex than many NGOs with their anti-development agendas would acknowledge. That alleged "attachment to the land" is determined not by raw emotion, rose-tinted idealism or tiresome cliché. Instead, it will be determined by the economic alternatives on offer. Make no mistake: people have taken their chances in festering, disease-ridden slums for centuries as a preference to living as a serf. Therein lies the great paradox of urbanisation. The discomforts, unrest and trials of the urban environment are all offset by the opportunities that originate in that same urban environment. In short, cities are not just a great civilising force for good; they also liberate the mind, deliver economic freedom and are an immeasurable positive sign of progress.

But clichés masquerading as informed opinion abound in Africa. One of our favourites, trotted out with stunning regularity, is the notion of an African "attachment to the land". We do not argue with the assertion that Africa is a continent made up of emerging economies and thus it is a simple truth to say that 60% of Africans live rural lives, 65% of the Sub-Saharan workforce is employed on the land and 30% of the continent's GDP comes from agriculture. For sure, on those terms, Africans have an "attachment to the land". However, saying that Africans' attachment to the land implies a need for alternative policy responses to the inevitability of urbanisation is surely ludicrous. If Africans have an attachment to the land, we could say with equal validity that they have an "attachment" to malaria, yellow fever and poverty.

Yvonne Mhango, our Sub-Saharan Africa economist, looks at the phenomenon of urbanisation in this report. The phenomenon is borne out by statistics, which can only be expressed in terms of an entire continent seemingly on the move. For example, in 1950, there was not a single city with over 750,000 inhabitants; 50 years later there were 231 cities which had surpassed this number; urban growth rates are above 3% pa in many parts of Africa, in 2001, 306mn Africans lived in cities and, according to the UN, this will increase to 787m by 2025, implying urban populations adding 20mn new residents every year.

But, the critical conclusion is less to do with urbanisation and more to with how it drives unexpected progress and change in the countryside. Consider the Lewis

Turning Point published in 1954 and named after Arthur Lewis, a Nobel Prize-winning economist. His theory postulates that a cheap supply of labour from the countryside keeps industrial wages down but eventually they will rise when the rural labour pool tapers off.

The theory has been given a new lease of life in the years since his death in 1991 given the migratory flows of peoples from the poor south to the rich north. Moreover it is a theory that has been played out widely in China where vast surpluses of rural migratory workers have played a significant part in keeping China's industrial output competitively priced as the country engages in its own urban revolution.

But the interesting impact is not so much what happens in the cities but what the Lewis Turning Point means for the countryside. As more and more workers flood into urban environments and the readily available pool of cheap surplus labour disappears, farmers are forced into a straightforward labour-capital shift. In short, farms must mechanise if they are to maintain their competitive position.

The key conclusion we drawn from this shift – and we see this as possibly one of the most important aspects of this report – is the extent to which the countryside has to react to urbanisation in terms of output. The evidence suggests that an inability to keep up with this strategic shift led directly to the food deficit, which has become endemic across SSA.

Smallholders, too, must make a decision: if they dedicate their supply of labour to generating urban-derived income what do they do with their land? Another way to look at this conundrum takes the form of a question: is the rise of the superfarm inevitable?

Superfarms

The rise of the superfarm is a relatively modern phenomenon. There are possibly fewer than 100 industrial groups or organisations that own, lease or operate farms of over 100,000 ha. An additional complication is that defining what constitutes a farm is hardly a straightforward exercise. After all, a 200,000 ha farm is most likely to be a series of clusters of 1,000-10,000 ha farms.

Arguments for or against smallholders and superfarms have become increasingly simplistic – naïve even – in recent years. Thus, we are increasingly faced with an argument that has descended into soundbites and trite mantras that can be broadly summarised as *smallholder good, superfarm bad*...or vice versa.

The reality is more complex; and it is not a question of good vs evil, rather what is inevitable and pragmatic. We look at the more emotive issues later in this introduction when we investigate the future of aid; but first we address some fundamental questions relating to superfarms.

- **Do economies of scale exist in agriculture?**

  They may or may not. The fact is that many industries are subject to the fallacy of size. Spend any time in China, as one of the authors of this report did for half his professional life, and everything soon comes down to size

and scale. Likewise, consider the spurious assumptions made over the economies of scale that are supposedly attached to banking and mobile telecoms. They barely exist, but management spends a lot of time suggesting they do. Agriculture is possibly similar. The purchasing power on inputs or selling power on output that comes with a 100,000 ha farm is likely to be no greater than a 1,000 ha farm. This is accentuated by two factors: first, managing 100,000 ha under a single corporate umbrella is more likely to result in managerial dis-economies of scale; and second: 100 farmers managing 1,000 ha plots each can easily form a co-operative, which will provide them with all the purchasing benefits of the superfarm and none of the managerial dis-economies of scale. The lack of middle management in agriculture is something we look at in detail in the final section of this report.

- **If economies of scale aren't evident, why do superfarms exist?**

  Historical reasons play a part, especially in East Africa, Southern Africa, Argentina, Brazil and the CIS. Technology and IT have also played a part: managing a 100,000 ha farm has become possible with the advent of new technologies. Superfarms also exist because they act as conduits for investment capital. In short, while managerial or operating economies of scale might not exist, financial economies of scale do.

- **If smallholders form co-ops, can they compete against superfarms?**

  Unlikely. Urbanisation and the variables it brings into play challenge the economics of the smallholder. The fact is that 85% of the world's farms are less than 2 ha in size and combined they likely account for between 60-70% of global output. Put bluntly, the economics of the smallholder are less than optimal. They have little purchasing power on the input side, they are perpetually undercapitalised and although they could form large co-ops – and some do – the non-agricultural trade-offs (which we investigate in the urbanisation section of this report) are unlikely to be reversed.

- **If smallholders had access to capital, would it make a difference?**

  It would make a huge difference. The fact is that appropriate access to capital at all levels could probably triple yields among smallholders in many African countries. This model was effective in transforming Brazil's agricultural landscape and some of China's successful agricultural reforms in the late 1970s were down to improved access to capital. However, two caveats should be noted here: first, in Brazil large-scale corporate farms have come to dominate capital flows over time, and second, Chinese peasants still leave the countryside in enormous numbers, despite the massive improvement in Chinese rural living from 1978.

- **But many of these superfarms seem to be unprofitable?**

  Not necessarily. Some are enormously profitable, while others make huge losses. Much of this comes down a variety of factors: the timing of expansion, which part of the value chain they operate on, management skills, political backdrop and so on. There is no "one size fits all" in large-scale farming.

- **So, there is a future for the medium-sized farm in Africa?**

  In some ways, yes, but it might only be an intermediate step for all we know at this stage. Much land aggregation in West Africa is actually attributable to rich urban dwellers acquiring land from smallholders who move to the city in search of work. However, this process is ongoing and what is to say that the rich urban dweller does not continue to aggregate land as a business as more becomes available.

We consider a few issues at this stage. The first is something we have already outlined: that we might only be at an intermediate stage in the development of farms as large-scale corporate entities. Twenty years back, IT systems did not exist that would have allowed these businesses to exist. And, while a 100,000 ha farm might sound like a formidable entity, it is only formidable in relation to other farms. Against Royal Bank of Scotland, Deutsche Telekom, Apple Inc and Unilever, it is a minnow.

Second, we note all the factors that we cannot possibly know at this stage. The telecoms and internet sectors provide useful templates. In these sub-sectors businesses were unprofitable for years before enjoying significant pay-offs, many years after they commenced operation or were licensed. Consider Amazon: founded in 1994 and just as it became profitable six or seven years later it embarked on another frenzy of launching multiple loss-leading lines outside its core books activity. Had it not engaged in that strategy, others would have done so before turning their attention to the destruction of Amazon's core book business. Likewise, a similar situation existed with the wireless operators where profitability was a distant prospect in the early 1990s. If you were a profitable wireless operator in 1992 and decided to stay that way, it was most likely you would have been out of business by the end of the decade.

Is farming going through a similar transformation? The previous non-farming examples were seeking an assortment of corporate objectives: critical mass, market share, purchasing power and maybe even those elusive economies of scale, all of which would lead to returns for investors. The farming industry, too, might have a number of holy grails, which it too is seeking out: low crop correlation is one. What this means is that a diverse range of agricultural products is grown across multiple geographies and therefore, the business has a lower risk profile. And that requires scale operations. Meanwhile, the range of technologies that will characterise the next generation of farming is not going to come cheap. Smallholders simply do not have the means to employ the levels of capital that will be required to upgrade the industry.

John Kenneth Galbraith recognised this last phenomenon in *The New Industrial Estate*, in 1967. Although 44 years of hindsight allows us to question some of the conclusions expressed, he was broadly correct in his assumption that a more complex business environment required a more bureaucratic and scientific approach to commerce with a management class to match. The growing complexity of agriculture and farming suggests that this under-capitalised, under-invested and under-industrialised sector is about to mirror the transformation that characterised other industries in the 1950s and 1960s.

Ultimately, the debate over superfarms comes down to money. How does one create a conduit for capital for investment in agriculture? Can smallholders provide that conduit? If so, it would be reasonable to assume they had a future in this most

strategic of industries. However, the volatility of food prices, the rapid urbanisation that characterises large parts of our planet, the relative undercapitalisation of the sector and the sheer variability of the agricultural labour force in its current form all suggest that in creating those conduits for capital, superfarms are likely to play a hugely important role in attracting capital to the sector.

These are some of the issues, which Adam Oliver attempts to address in his section on superfarms. We understand how EMBRAPA has become a pioneer in all kinds of advanced and sophisticated agricultural methods: perhaps Africa can experience something similar.

Sustainability

We have discussed urbanisation and the rise of the superfarm, and outlined some of our broad conclusions. However, we have yet to address the essential issue of sustainability. One of the overriding issues for humanity is that every civilisation, city-state and society with an urban heartland has been built upon the availability of food and water. In fact it is the existence of those food and water resources, which has allowed urban societies to flourish. However, over time, every single one of those civilisations, societies and states has collapsed because its depleted and exhausted hinterlands could not supply its cities with their food and water needs.

To give a single, stark example: Roman civilisation was built on an availability of food resources in the hinterlands around the city of Rome itself. When the Roman Empire dissolved in the 5th century AD, it had become increasingly reliant on food imports from far-flung outposts of its empire, including Egypt. In short, Rome, an urbanised empire, had no food security and was ultimately unsustainable. If only this was an isolated example then perhaps we could rest our minds and assume that somehow the planet can muddle through. The truth that needs to be universally acknowledged is that every civilisation has collapsed because it could not address the sustainability issue.

We firmly believe markets and free trade can resolve many of mankind's problems. However, if we have learned anything from the financial crisis it is that free markets give the appearance of functioning well up to the point at which they fail catastrophically. Unfortunately, catastrophic failures of financial and food markets have devastating consequences for entire societies. Thus, we would do well to find some answers on the question of sustainability that do not involve stocking up on baked beans, high-velocity rifles and checking out the classified ads for rental properties in Montana.

We do not take an entirely misanthropic view and that somehow we have been lucky so far. As we see it, societies have chosen to accept the multiple benefits of progress without simultaneously questioning any parallel costs that might emerge with that progress. Consider the car: most people would acknowledge the huge benefits that accrue from the development of the automobile and most would be pragmatic enough to know that it comes with many economic, social and environmental costs attached.

With agriculture we know the benefits of tarmac, refrigeration, chemical fertilisers, irrigation, genetic modification of seeds and how all of these benefits have allowed

us to feed ever-growing numbers of urban populations and stretch our supply lines over an increasingly widespread area. No doubt, the wonders of genetic modification will allow us to maintain this position for some time yet, and the weather may well be on our side. However, the biggest cost of all is probably the one for which the bill has yet to be presented.

In other words, we need to acknowledge both the economic costs and the seemingly inevitable lessons of history. How the day will most likely come when these fantastically intricate systems malfunction. And that is where sustainability comes in. The manner in which we address these issues will require neither a slavish adherence to markets nor a belief in the power of government to do good. Like the development of Brazil's Cerrado, it will require a combination of the two, but above all it will require pragmatism, clever thinking and open minds.

Orleans Mfune, a Zambian national, is about to complete his PhD at Glasgow University. He has spent the past few years of his life looking deeply at this issue of sustainability, and in particular the notion of conservation agriculture. In an era where we might need to question many of our prevailing orthodoxies, he offers some unconventional insights into how best to address the issues of sustainability in Africa.

The future of aid

In 1984 during a great African famine, a South African businessman, Peter Pretorius sold his possessions and drove into Mozambique to help alleviate the suffering that had engulfed large parts of East Africa that year. During his trek, Pretorius was trapped in a refugee camp with no food, water or spare clothing alongside 34,000 starving people. Within a day he was forced to drink the same tainted water as everyone else and he helped to bury 30 dead every day. Ten days later, Pretorius was rescued and returned to South Africa where he founded Joint Aid Management (JAM).

Twenty-seven years later, JAM feeds 700,000 African schoolchildren on a daily basis. That alone makes for an interesting story but what makes it compelling is the fact that JAM is in the midst of transforming itself from humanitarian aid agency to commercial organisation under the auspices of a new corporate entity called African Commercial Development.

This has huge implications: for too long humanitarian aims and commercial ambitions have been viewed as mutually exclusive. The few who occupy the tents off London's Paternoster Square are telling those in the adjacent citadel of capital that the moral compass revolves around them and not those in the glass block temples to finance that tower over them. This is sketched out on a wider African canvas, where too many aid agencies set agendas that we believe hamper commercial development across the continent. If you want to read a document paved with good intentions, and which lays claims to the moral high ground, check out Oxfam's report, *Growing a better future: food justice in a resource-constrained world* published on 1 June 2011.

This is no place to assess the entire document, but we believe many of the observations and views expressed in this report are contradictory, ill thought-out or

illogical – so much so that it makes a nonsense of any conclusions made. In our view, the report is on a level with a teenager's guide to saving the world. Here are a few randomly chosen statements.

On page 16: *"Sadly, investment in developing country agriculture, despite the huge potential benefits, has been pitiful."* However, we only need to get two pages further on and page 18 has the following observation *"Research…identifies over 1,200 land deals reportedly under negotiation or completed, covering 80m hectares since 2000 – the vast majority of them after 2007"*.

On page 19, Oxfam criticises the approach taken by one prominent agriculture investor in Africa, which is *"to identify poorly managed or failing farms and buy them up at distressed prices"*. We'll ignore the fact that this seems like a uniformly good thing. It strikes us as a manifestly better strategy than watching the farm fall into ruin like so many investment projects have done over the past 30-40 years (thus creating the problem in the first place). However, it is the next statement that is truly staggering in its lack of understanding of how markets work. *"But the risk remains that some investors will be interested only in the easy return on land, rather than the trickier business of growing food"*.

What we fail to understand here is how the land can rapidly appreciate if no food is grown on it? No yield, no value – it is that simple. For sure, if they mean using the land for development, we can just about understand the point being made. However this would suggest that urbanisation had taken off to such an extent that those involved in the "tricky business" of growing food will be making money hand over fist.

On page 39: *"Holdings in commodity index funds rocketed from $13bn in 2003 to $317bn in 2008 as investors stampeded to a safe haven from capital markets in meltdown"*.

Since when did agricultural commodities become a "safe haven"? We seem to recall soft commodities crashing from their 1Q08 highs as the financial crisis took hold. We would never have seen agriculture as a safe haven in 2008, or any other year. A product whose output is weather dependent is not a safe haven. More to the point we would not have followed the above statement with the following observation on page 47 *"One of the reason why food prices hit such highs in 2008 is that markets were trading so thinly"*.

Were it not for the fact that Oxfam is an influential organisation and is engaged in some noble work, you could discard this, or at least treat it as pure comedy gold. That committee-driven reports like this are taken seriously, tells us that something, somewhere has gone terribly wrong. Adam Smith, a Scottish philosopher who, like Keynes, has been hijacked in recent decades, is best known for *An Inquiry into the Nature and Causes of the Wealth of Nations*, originally published in 1776. A less well-known work, but one we believe ought to be equally prominent, is *The Theory of Moral Sentiments* published 17 years earlier, in 1759. In short, this book married self-interest with moral judgement and laid the foundations of modern capitalism. In modern Africa – and perhaps across a wider universe these days – somehow the link between an innate sense of morality and self-interest seems to have been lost.

Perhaps this split is not irreversible. What the philosophy of Adam Smith said some 250 years ago, and the actions of some of the more forward-thinking aid

organisations today, tell us is that capitalism and morality are not mutually exclusive and that the link between the two can be restored. On a less philosophical and more practical level, JAM provides an example of an organisation that has forced itself to address the difficult questions of what aid is for, is it sustainable and does it liberate or subjugate its recipients.

In the chapter on the future of aid Isak Pretorius and Jim Lutzweiler of JAM/ACD look at the issue of aid and how a humanitarian business can be transformed and fashioned into an entirely different type of organisation. Its success is tied in with that of Africa and its aim is simply to put its aid arm out of business. In short, the success of this initiative means that there will be no JAM tomorrow. Perhaps Oxfam might learn something from them.

Strategic outcomes

The chapters throughout this report highlight a number of the strategic themes that we believe will be played out across the sector in the next few years. Nevertheless, we do not suggest that this report is anything near a definitive document. It merely highlights the macro factors we believe will influence the African agriculture sector in the years ahead. But if these factors influence the sector, what are the investments themselves likely to look like in the years ahead?

If Africa represents a final frontier in investment, we think it is possible that some of the investment models that are likely to emerge already exist elsewhere.

An obvious constraint is the mismatch between investors and the vehicles into which they can invest. A paradox that has endured in recent years is that agriculture remains an industry of global importance, of enormous interest to investors and one undergoing some profound structural change. Despite all this, listed, liquid vehicles remain the exception rather than the norm (although not in the capital-intensive inputs side of the business involving seeds, fertilisers and machinery). In short, the conduits for capital are as weak as the physical goods markets in which they invest.

One parallel worth considering is that of China. The earliest businesses to tap foreign capital on public markets were the B-share markets in Shanghai and Shenzhen. This was followed by H-shares in Hong Kong, the so-called *red chips*, and finally a raft of state-owned enterprises listed under a variety of methods on several exchanges simultaneously. All were responses to the demands of investors, and we expect to see something similar emerge in the years ahead, across Africa.

There is also an alternative integrated value-chain model, which is a regular feature among Russian, Brazilian and Ukrainian businesses. This, too, could form a template for African enterprises and it would not surprise us to see a large amount of backwards vertical integration take place across Africa among various food processing companies which have some brand value.

Our key conclusion is that the type of vehicles that will dominate African agriculture in the years ahead may not even exist yet. Just as investor interest in Shanghai Dazhong Taxi and Shanghai Industrial Sewing Machine was eclipsed by the likes of CNOOC, China Mobile and ICBC, we could see a similar trajectory in African agriculture.

Unlocking Africa's potential

Few people at the beginning of the 19th century needed an adman to tell them what they wanted – J K Galbraith

The most tragic paradox of our time is to be found in the failure of nation states to recognise the imperatives of internationalism – Earl Warren

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It seems fear and negativity always govern our most predictable of clichés. Thus, a China that is big, successful and growing rapidly, is somehow seen as an existential threat to the rest of the world – whether through the relentless ambition of its institutions, its overpowering need for resources or its towering desire to be taken seriously as a leading power.

If this is success, logic would have it that Africa, with its perennial economic underperformance and seeming lack of overarching ambition, is viewed positively as a result. Not a bit of it. Overpopulation is seen as a problem, so too are disease and famine, despite the ability of the latter to sort out the former. Well-worn media images of failure are firmly entrenched in the public mind for generations. Thus the "success" of China is a potential threat and the "failure" of Africa is…also a potential threat.

Perhaps the human mind simply cannot cope with too much optimism simultaneously. Thankfully, perhaps, the world doesn't consist entirely of Scots, Finns and Russians. So, we believe it is probably best to look at Africa and China in tandem, rather than in ill-fated isolation, for no better reason than the fact that their individual economic success is likely to be mutually dependent on each other.

In our view, unlocking the potential of African agriculture is likely to emerge as one of the great geostrategic themes of the next two decades. Again, in a world laden with ironies and paradoxes, the availability of fertile land, an abundant water supply and a vast, inexpensive pool labour have not transformed Africa into an agricultural powerhouse. Instead, Africa remains a net importer of food and in substantial quantities – as a $28bn annual food deficit suggests.

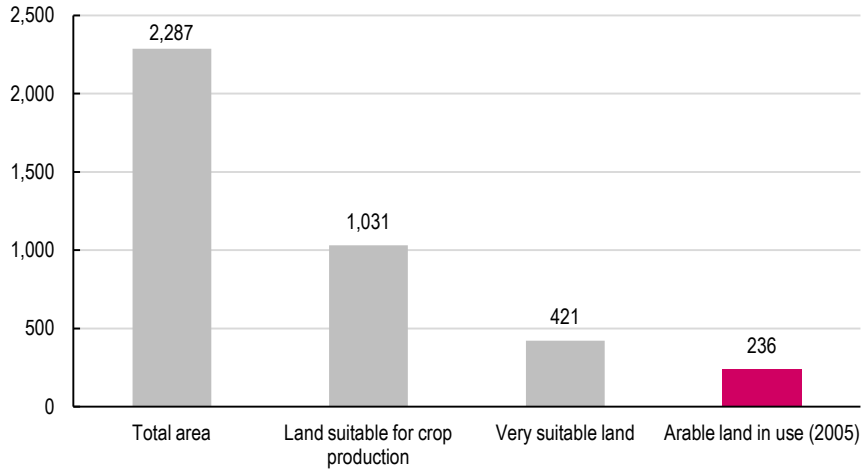
We acknowledge the potential for the last paragraph to return some decades in the future to torture us in our dotage, in the manner of Paul Erlich's predictions in the 1970s. Nevertheless, we believe many of the structural impediments to agricultural growth in Africa are being removed in such a manner that the sector can undergo a renaissance.

We have all become increasingly aware of the demand side of the equation and the familiar drivers of food demand – population, urbanisation and income growth – coupled with new factors, such as biofuels. All these are inexorably leading to increased food requirements. We look at these in greater depth in the section on food security. However, we conclude that while the world is not in imminent danger of societal collapse through a lack of food and capabilities for producing it, the world needs to find ways of opening up if it is to meet demand in the years ahead.

To get an idea of Africa's potential, consider land. According to the FAO, Sub-Saharan Africa consists of 2.3bn ha of land. Nearly 1bn ha is suitable for rain-fed crop production. Of this 1bn ha, some 421mn ha is described as "very" suitable for crop production. In this context, "very" suitable means that the attainable yield in these lands is 80-100% of the maximum theoretical yield. To put this into perspective, in 2005 the total arable land in use in Sub-Saharan Africa amounted to

236mn ha, or only about 24% of the total suitable area. Obviously, not all of this land in use would fall into the “very” suitable category. But, even if we go with that extreme assumption, the land in use would still only be just over half the potential “very” suitable land.

Figure 5: Sub-Saharan Africa's agricultural potential - Land area, mn ha

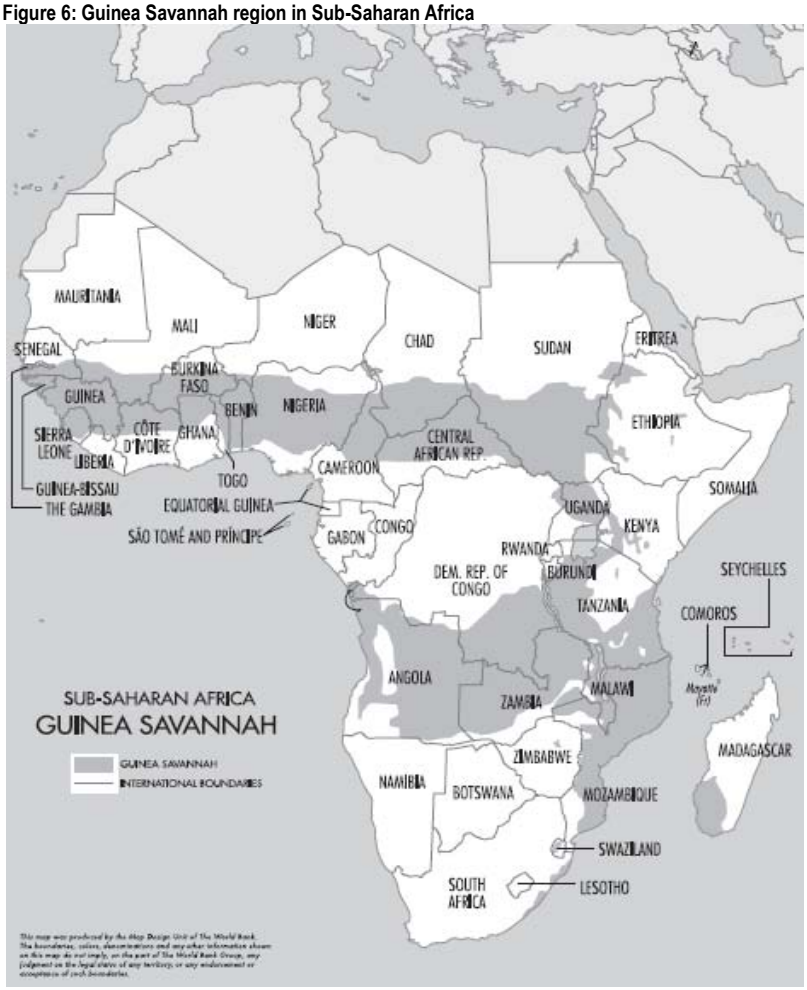


Source: FAO

Clearly, not all 1bn ha of suitable land can be cropped – and by extension, not all of the 421mn ha of “very” suitable land can be cropped. A proportion of this land is already under use for non-agricultural activities such as human settlement, economic infrastructure, forests, protected areas and so on. Even so, the sheer scale of the potential gives us a high degree of comfort.

A more focused study, conducted by the World Bank, explores the potential of the Sub-Saharan Africa’s Guinea Savannah zone. It is an agro-economic region encompassing approximately 600mn ha of land in Sub-Saharan Africa, with a warm tropical climate, annual precipitation of 800-1,200 mm and generally poor soil quality. Of this, nearly 400mn ha of land can be used for agriculture. However, at the current juncture, less than 10% of that land is in agricultural use.

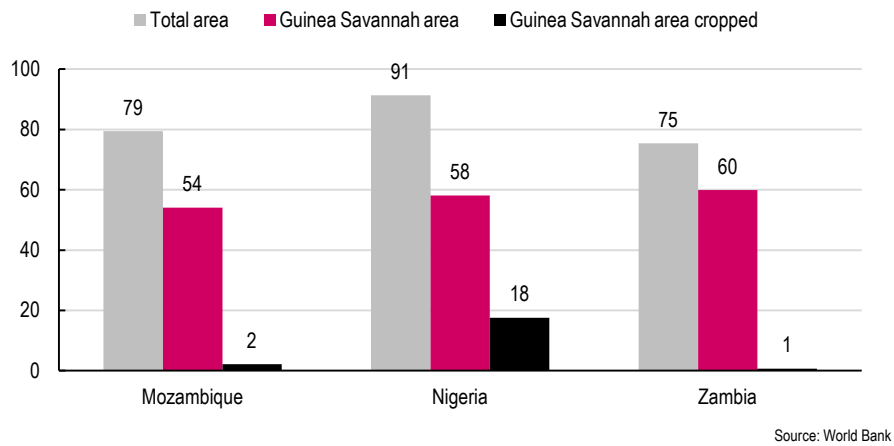
Figure 6: Guinea Savannah region in Sub-Saharan Africa



Source: IFPRI via World Bank

The study features several countries, most of which fall within the Guinea Savannah zone; and Figure 7 shows the extent to which this fertile belt is underutilised in the countries featured.

Figure 7: Extent of Guinea Savannah area in a few African countries, mn ha

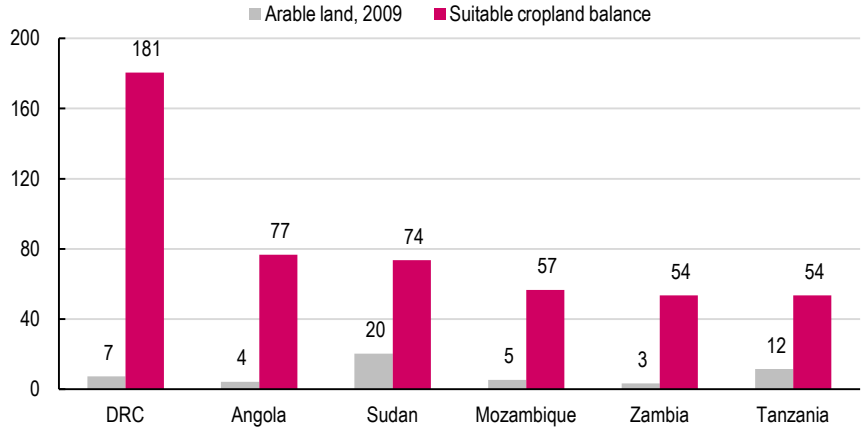


Source: World Bank

To understand the scope for expansion, consider that the FAO estimates the additional land required to feed a larger and richer world in 2050 at only 71mn ha. We explore this in more detail in the section on food security.

Figure 8 shows the Sub-Saharan countries, which have over 50mn ha of suitable cropland that is not currently in agricultural use. Although these numbers do not exclude human settlements, forests and so on, they demonstrate not only the agricultural potential of Africa but also how future needs could be met by a small, rather than a large, number of countries.

Figure 8: Arable land and suitable cropland balance in a few African countries, mn ha

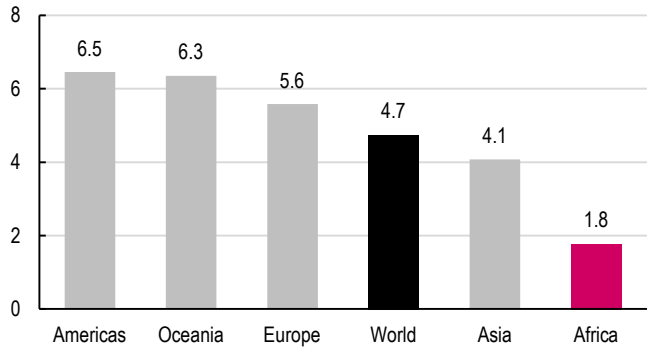


Source: FAO

As we have noted before, land is only one part of the supply equation; an adequate water supply is also essential to ensure that the land can fulfil its potential. Again, mirroring the availability of land, Africa is also endowed with sufficient water resources – both renewable and precipitation. Of the available water, only around 2% is used for irrigation, leaving sufficient scope for expansion. We focus on this issue on the following section on food security.

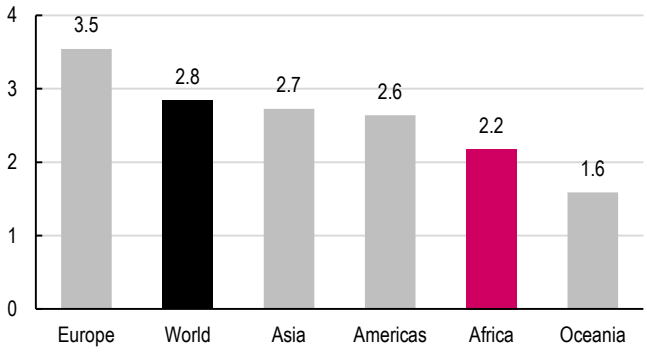
So, if the availability of land and water is not an issue then the impediment between potential output and actual output is the wide differences in yields achieved in Africa compared with the rest of the world. Figures 9-12 compare the average yields from 2000 to 2009 for several key commodities across various regions.

Figure 9: Corn yield, 2000-2009 average, t/ha



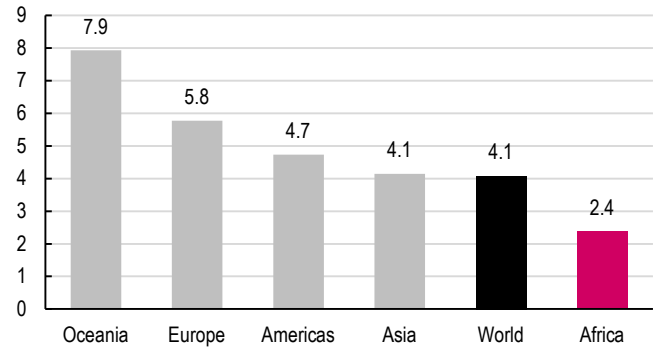
Source: FAO

Figure 10: Wheat yield, 2000-2009 average, t/ha



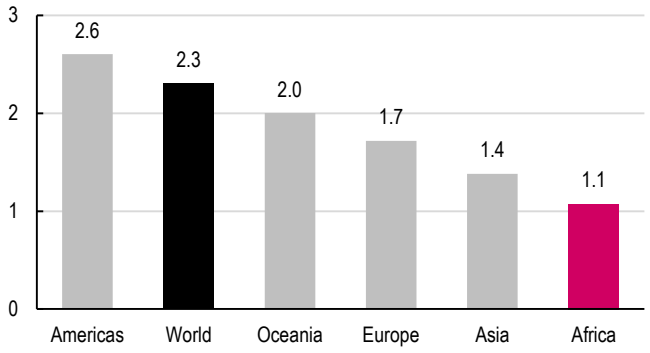
Source: FAO

Figure 11: Rice yield, 2000-2009 average, t/ha



Source: FAO

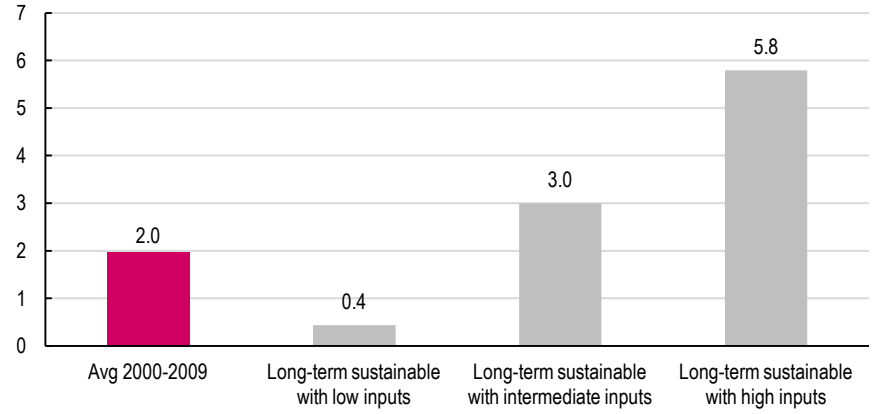
Figure 12: Soybeans yield, 2000-2009 average, t/ha



Source: FAO

As the evidence above illustrates, African yields are the lowest in the world for corn, rice and soybeans and above only Oceania for wheat. To get an idea of the extent of possible improvement, consider Figure 13, which shows the long-term sustainable cereal (wheat, corn and rice) yields that can be achieved in Africa with varying levels of inputs. In this context, the levels are generically defined, and represent farming technology, nutrient inputs, and management practices.

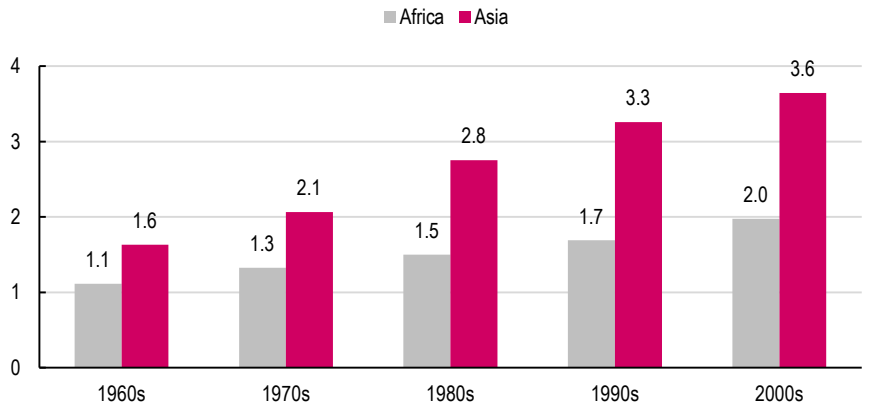
Figure 13: Cereal yields in Africa, t/ha



Source: FAO

If African cereal yields improve to the level achievable with intermediate inputs, it would imply a large increase in agricultural output. For some historical perspective consider the evolution of cereal yields over the past five decades in Africa and Asia. In the 1960s, Asian yields were about 46% higher than African yields. But, over the next two decades as the green revolution spread throughout Asia and skipped Africa, the difference in yields widened. In the 1990s, Asian yields were nearly double African yields. Only in the past decade have African yields grown faster than Asian yields, narrowing the gap marginally. The strong growth trajectory experienced over the past 10 years suggests African agriculture can be transformed if these improvements are maintained over the course of the following decade.

Figure 14: Average cereal yields, t/ha



Source: FAO

To get an idea of what these higher yields might mean for Africa, consider the following: Africa's cereal output in 2009 was 108mnt and the average yield was 2.2 t/ha. Increasing the yield to 3 t/ha would increase the output to 148mnt without any additional harvested area. In other words, output would increase by more than one-third. However, even this increased production would not have been sufficient to satisfy demand, as cereal consumption in 2009 was 152mnt.

By 2050, the FAO expects cereal consumption in developing countries to grow more than 60% from current levels. If we assume a similar growth trajectory for Africa, consumption in 2050 would be approximately 243mnt. The FAO also expects 27% growth in arable land in Africa during the same period implying an additional 63mn ha for cereals. If we assume that African yield growth in the next four decades is similar to that of Asian yield growth over the past four decades, African cereal yields in 2050 would be approximately 3.5 t/ha. This would imply production of approximately 219mnt – still some 24mnt below 2050 consumption.

While it may not seem to be much of an improvement from the current deficit of 44mnt, we regard the above assumptions as conservative. Based on the extent of land availability and the increasingly global focus on African agriculture, the planted area is likely to increase by more than 27%, we think. Similarly, African yield growth is likely to be faster than Asian yield growth because the latter experience provides valuable lessons for Africa. Moreover, technological transfer will also have a positive impact. However, any reduction in the deficit should be welcome, especially when it is realised despite an increase in competition.

The preceding section looked mainly at cereals. However, Africa also has the potential to make an impact in other commodities such as palm oil and sugar. In these cases, climate and geography in much of Sub-Saharan Africa gives it a competitive advantage. For example, Malaysia and Indonesia are beginning to face limits to the expansion of palm oil production. A grant of $1bn from the government of Norway to the government of Indonesia to reduce its deforestation rates might pale against Norway's $20bn-plus annual investment in its domestic oil industry, but it does give an indication of potential supply constraints in Southeast Asia. Future growth will likely have to come from countries such as the Democratic Republic of Congo, Cote'Ivoire, Cameroon, Sierra Leone and Liberia.

Lest it appear that we are confusing potential with performance, we acknowledge that it is easier to calculate increases in yields and output than to actually realise them. There are numerous road blocks, ranging from lack of capital, sub-optimal farming practices and a lack of skilled labour, to non-availability of high-yielding seeds and unfavourable government policies. The World Bank study on the Guinea Savannah region we cited earlier explores a few of these issues. Specifically, it compares the Guinea Savannah region in Africa with similar agro-ecological zones, namely the Cerrado region in Brazil and the North Eastern region of Thailand, both of which have been which transformed from relatively backward agricultural regions to successful agricultural exporters.

The Brazil case study

As noted, potential remains just that unless a concerted effort is made to unlock it. Brazil is a staggeringly successful example of a nation where a large-scale hinterland was transformed into an agricultural stronghold over the course of several decades. However, before we look at the steps taken to turn Brazil from agricultural backwater to agricultural powerhouse, we note four broad factors to dispel any myths and pre-conceived notions about the Brazilian agriculture sector:

- This process from the formation of EMBRAPA in 1973 to the point where a wider investor community began to take notice of the Brazilian agriculture sector took more than three decades. Commentators, all too frequently, overlook these lead times. In short, it was not an overnight success story.

- Another factor worth emphasising at the outset is that this was initially a government-inspired plan to develop the country's hinterlands. In addition, much of the success of the project could be attributed to the fact that it was executed under a military dictatorship.

- Brazilian infrastructure and supply are still in poor shape. Some 93% of the country's roads are unpaved, port bottlenecks are the norm, large-scale public infrastructure investment programmes have failed to achieve their original aims and to get produce from the Cerrado to the country's ports necessitates a 2,000 km journey.

- There are both private sector and public sector aspects to the Brazilian case study. The success of the Cerrado's development is not fully attributable to either. Instead, it relied on focused strategic aims set out by government, *and* a resourceful private sector willing to take risks in an area lacking a history of large-scale agriculture.

As noted, the government has played an important role in shaping Brazil's agricultural sector. Government incentives for agricultural producers are wide ranging and have contributed significantly to growth in the sector. These include preferential credit, tax exemptions, financing for agricultural research, marketing and infrastructure improvements as well as an array of Federal, State, and local subsidies. Despite that, public expenditure on the agricultural sector is low compared with recent years. Agricultural expenditure accounted for only 1.8% of total government expenditure in the period between 2003 and 2005, compared with 5.6% in the period between 1985 and 1989.

The development of Brazil's agriculture sector

Brazil's strong performance in the agricultural sector can be attributed to a range of factors many of which date back decades. Whether in agriculture or in other policymaking frameworks, decisions and policies implemented in the distant past often have benefits that are realised years later and Brazil's agriculture sector is no stranger to this truism. Moreover, we cannot isolate the successes and say that they were due to a free market model or an interventionist model: it all depends how you look at it. Some of the successes were even rooted in an initial failure e.g., the devaluation of the currency in 1998-1999 was a policy failure with hugely positive implications for the agriculture sector. The modern evolution of the Brazilian agricultural sector can be divided into three distinct phases.

- The geographic expansion phase (1945-early 1970s)
- The intervention/modernisation phase (early 1970s-late 1980s)
- The free market period (early 1990s-present)

The geographic expansion phase (1945-early 1970s)

Brazilian agriculture remained primitive during this phase. Yields were consistently low and there were few policy initiatives to modernise the sector. It was characterised by an export sector that relied primarily on coffee, cotton, sugar and a few minor commodities and a semi-subsistence sector that produced for the domestic market. In common with neighbouring Argentina the government ensured that it was the urban-industrial constituency which was favoured at the expense of the rural sector and the agriculture sector. In tandem with the Perónist government next door, the Brazilian government implemented an import-substitution strategy to promote domestic economic growth while limiting foreign debt and foreign exchange. Brazil's agricultural exports were heavily taxed, using both direct and indirect policies in an effort to supply the urban sector with cheap agricultural products. Export quotas and licences, as well as prohibitions on trade, were applied sporadically, and often combined with direct export taxes on Brazil's major agricultural commodities.

Incredibly, the overall performance of the agriculture sector during the period was reasonable, due to horizontal (i.e., geographic) expansion. No doubt, import substitution and industrialisation policies were major disincentives to investment by landowners and farmers. However, these were circumvented through the maintenance of adequate land access on concessionary terms. Geographic expansion, through the incorporation of new land and aggressive road construction policies, resulted in an annual crop output growth of 4.3% over the period between 1949 and 1963. Yields remained ghastly, however. While the region witnessed a mere 17% yield increase from 1949 until 1969, the total cultivated area increased by almost 83%, to over 39m ha, in the same period.

The intervention/modernisation phase (early 1970s-late 1980s)

As horizontal growth reached its natural limits by the end of the 1960s, the agriculture sector underwent a phase of modernisation driven by capital inputs and strong government intervention. The increased emphasis on capital intensity was aimed at the bigger agri-businesses and ensured that access equipment and

chemicals were more readily available. The government introduced a far-reaching reformulation of agricultural strategy which included some key initiatives outlined below.

- The establishment of a rural credit system in 1965 providing financing on easy terms to commercial agriculture.
- The implementation of a broad-based research body focusing on agriculture in 1973 – the EMBRAPA system.
- An improvement in the instruments used in, and the administration of, minimum price policies.
- Inducements for the formation and expansion of agribusiness complexes.

The availability of subsidised credit expanded markedly and, until the mid-1980s, it had a remarkable impact on both production and productivity. However, in the 1980s, the effectiveness of agricultural credit in expanding output began to weaken as the debt crisis took hold and the rural credit system became increasingly regarded as wasteful and distorted. In the second half of the 1980s the incentives and subsidies of the credit policy were replaced with those provided by the minimum price policy. The minimum price policy, together with the currency devaluations of the 1980s, brought about a considerable expansion and diversification of agricultural exports.

The output of grains and oilseeds increased from 22mnt in 1965, to 58mnt in 1985 and 72mnt in 1989. Exports increased from $1.3bn in 1965, to $5bn in 1975. In a span of about 20 years, Brazilian agro-industrial exports became increasingly diversified, going beyond a small group of tropical commodities (mainly coffee, sugar and cocoa) and incorporating new products such as soybeans, meat, ethanol and fruit. However, agricultural exports increased at a much slower pace than the country's total exports. While in 1965 agricultural exports represented 83% of the country's total exports, their share declined to 39% in 1985 and to 30% in 1990.

The free-market period (early 1990s-present)

The agriculture sector expanded rapidly in the mid-1980s when the policies, which had diverted resources from agriculture towards the industrial and services sectors, were dropped. Economic reforms in 1985 eliminated domestic and export taxes on agricultural products. Export restrictions on soybeans, cotton and meat were also removed, as was the requirement for corn import licences. During the early 1990s, government intervention and support measures were reduced; some state-owned enterprises were sold, minimum support prices were abolished, government purchases of wheat and milk were removed and the marketing boards for coffee, sugar and wheat were abolished.

However, possibly the most significant economic factor affecting agricultural output in Brazil since the mid-1990s was macroeconomic: the introduction of the Real Economic Stabilisation Plan. With inflation levels in excess of 1,000% before 1994, the government introduced the Real, which stabilised the economy, reduced inflation to approximately 5% per year and ignited a consumption boom which lasted five years. However, in early- 1999, Brazil adopted a floating exchange rate, which led to a significant devaluation of the currency. Being a low-cost industry with a propensity

to export, this devaluation had a positive effect on the country's agriculture sector – especially soybean and meat production. As a result, production of major crops (soybeans, corn, rice, edible beans, and wheat) rose to 54mnt in 1990, double the 1970 level.

It might seem unusual for a sector to perform well under two seemingly contrasting economic environments. In retrospect, the reason is probably quite simple. The introduction of the real (in conjunction with the microeconomic reforms of that time) helped to promote a more benign investment and domestic consumption environment so that when currency devaluation came, export growth gained prominence.

The reforms of the 1990s have proved enduring. Crop production in Brazil reached an all-time high in 2008, more than a fourfold increase from 1970 and double that of 1990. Exports witnessed a sharp increase in the period 1990-2009, with total export value increasing sixfold in the period.

The role of government

As outlined in the previous section, agricultural policy goals and programmes in Brazil have changed significantly over time. During the mid-1960s, the sector was uncompetitive – except for a few tropical products such as coffee and sugar – and was characterised by an uneven distribution of farm income which almost institutionalised large and unproductive landholdings. The period between the mid-1960s and the early 1980s was a period in which government intervention was the norm: in agricultural commodity markets, by means of subsidised rural credit, with price support mechanisms, through government purchases and storage of excess supply and so on. During this period, agricultural policy centred on the objective of promoting food security for an urbanising population while compensating the agricultural sector for its anti-export bias.

However, calamity almost inevitably leads to reform, and the debt crisis of the 1980s forced the Brazilian government to reduce support to farmers and review its sector policy goals. Structural reforms introduced in the early-1990s witnessed the elimination of export taxes and price controls, deregulation and liberalisation of commodity markets, the unilateral reduction of trade barriers and the introduction of private instruments for agricultural financing.

Significant policy changes were introduced by 1995, shifting the priority towards land reform and family farming. The government created a new ministry, the Ministry of Agrarian Development (MDA), to run programmes targeted at family-run farms and land reform. It also adopted policies targeted at family agriculture (known as PRONAF), including subsidised credit lines, capacity building, research, and extension services. Federal government expenditure on land reform increased from 6% of total farm programme spending during the Sarney administration (1985-1990) to 45% during the first Lula administration (2003-2005). The number of agriculture-related programmes increased from 30 before 2000 to 100 in 2003. Overall, however, government expenditure on agriculture decreased both in relative and absolute terms and traditional agriculture expenditure was sacrificed to support land reform programmes. It fell from 5.6% of total government expenditure during the Sarney administration to about 1.8% by 2005.

With significant institutional and policy changes, the Brazilian agriculture system made the transition from a traditional local business to an increasingly global and industrial model. Rising incomes, urbanisation, economic liberalisation and access to competitive raw materials led to an investment boom by multinational food processors and retailers during the 1990s. Increased foreign direct investment (FDI) by large private agribusinesses displaced domestic competitors, increased industry concentration and eliminated many medium and small companies. Farmers in Brazil are increasingly exposed to markets that are much more demanding in terms of food quality and safety, are more concentrated and vertically integrated and are more open to international competition.

Figure 15: Average annual expenditure on agricultural policies (base year 2005), BRLmn

Period	Traditional agriculture	Agrarian organisation (land reforms)	Total	Traditional agriculture/Total	Agrarian organisation/Total	Agricultural expenditure/Total government expenditure
1985-1989	19,549	1330	20,879	94%	6%	5.6%
1990-1994	17,510	1229	18,739	93%	7%	2.8%
1995-1998	15,273	3,342	18,615	82%	18%	3.4%
1999-2002	8,712	3,290	12,002	73%	27%	2.0%
2003-2005	5,901	4,809	10,710	55%	45%	1.8%

Source: American Agricultural Economics Association

The detail outlined above is – in isolation – interesting but not of direct relevance to Africa. For sure, it offers a possible template for development of the African agriculture sector but it is the relationship between Brazilian supply-side factors and Chinese demand factors, which are more relevant to African agriculture.

Feeding a Chinese boom

The other major driver of the Cerrado's success arises not in Brazil but at the other side of the world, namely China, and its inexorable rising demand for soybeans over the past decade.

The Chinese consumption boom cannot be considered new news these days. The world has become familiar with a richer, more urbanised China and its increasing consumption of meat and, thus, its increasing demand for grains and oilseed feedstock. While we do not agree with the scaremongering that usually accompanies this analysis, we believe that Chinese self-sufficiency in several key grains – wheat, rice and corn – is likely to be reversed in a dramatic fashion over the next few years.

In 2001 the average Chinese consumed around 43 kg of meat pa, of which almost 75% was pork. Overall the country consumed 54.7mnt of meat at that time. Over the next decade annual per capita consumption rose to approximately 54 kg, a 22% increase while overall consumption rose by 25% to 68.4mnt.

Figure 16: Total meat consumption, mnt

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011E
China	**54.7**	**55.9**	**57.6**	**58.5**	**60.8**	**62.1**	**60.2**	**64.8**	**66.8**	**69.2**	**68.4**
Japan	5.4	5.5	5.5	5.4	5.6	5.6	5.6	5.6	5.7	5.8	5.7
South Korea	2.2	2.4	2.4	2.3	2.3	2.5	2.6	2.7	2.7	2.9	2.9
Hong Kong	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9
Taiwan	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.5	1.6	1.6	1.6
Singapore	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3
EU	37.6	39.0	39.0	38.7	39.2	38.8	40.3	39.8	39.8	39.8	39.5
US	34.6	36.0	36.0	36.8	37.0	37.5	37.8	37.1	36.6	36.5	36.3
Russia	5.9	6.5	6.5	6.3	6.9	7.2	7.8	8.4	8.2	8.3	8.4
India	2.5	2.8	3.0	3.3	3.5	3.7	4.0	4.4	4.5	4.6	4.7

Source: USDA

Impressive as this increase may be, we see further scope for growth. Consider that the average Taiwanese in 2001 consumed around 75 kg of meat annually. In the past decade, the Taiwanese diet has witnessed a 4% decline in overall meat consumption, but the per capita consumption is still almost 71 kg – over 31% more than the corresponding figure for the average Chinese. If China's per capita meat consumption equalises with Taiwan, it will require approximately 91mnt of additional grains – slightly more than the entire corn output of Brazil and Argentina in 2011.

Figure 17: Annual per capita total meat consumption, kg

Country	2001	2011	2020E	2025E
China	**44**	**54**	**67**	**73**
Japan	43	46	49	51
South Korea	46	60	70	76
Hong Kong	107	143	151	156
Taiwan	75	71	82	87
EU	73	77	79	80
US	113	108	107	109
Russia	41	58	64	67
India	3	4	4	4

Source: FAPRI

Of course, some might be tempted to use the per capita consumption statistic for Hong Kong as a future target for China. However, at 143 kg per person, more than double the Taiwanese figure, we believe Hong Kong is an extreme case on account of its unusual status as a regional hub with a large influx of foreigners and tourists.

Regardless, we believe meat consumption will continue to increase as incomes rise. We also note that FAPRI does not expect Chinese per capita consumption to reach current Taiwanese consumption levels until 2025. We add one caveat here (which we believe confirms the conservative nature of our view): that is, our benchmarks suggest Taiwanese meat consumption stagnates at 71kg per person while FAPRI forecasts that it will rise to 87kg by 2025. These long-term forecasts are below current US levels of consumption but we believe it much more likely that world protein consumption will level out sharply at some point in the future. The key factor though is that consumption in China will undoubtedly rise and using Taiwanese current consumption as a benchmark is a highly conservative approach.

To understand the longer-term implications, we need only look at what has happened with soybeans in China over the past decade.

In 2001, China produced 15.4mnt of soybeans. The country's production has stagnated for a decade and only managed to get above 16mnt in 2004 and 2005. This year, the US Department of Agriculture expects it to decline to 14mnt. Exports are almost non-existent but domestic consumption has rocketed from 28.3mnt in 2001 to 71.6mnt in 2011 as the country's dietary requirements change. All this has been met by imports, which have risen from 10.4mnt to 56.5mnt in the same period. Most of this increase in imports of about 46mnt has been met by Argentina, Brazil and the US, which have increased their exports in the same period by about 36mnt. Specifically, Brazilian exports during this period rose nearly 22mnt, thanks mostly to the Cerrado's transformation.

Figure 18: Soybean statistics

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011E
Area, mn ha	9.5	8.7	9.3	9.6	9.6	9.3	8.8	9.1	9.2	8.5	8.3
Yield, t/ha	1.6	1.9	1.7	1.8	1.7	1.6	1.5	1.7	1.6	1.8	1.7
Production, mnt	15.4	16.5	15.4	17.4	16.4	15.1	13.4	15.5	15.0	15.1	14.0
Imports, mnt	10.4	21.4	16.9	25.8	28.3	28.7	37.8	41.1	50.3	52.3	56.5
Exports, mnt	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.4	0.2	0.2	0.2
Consumption, mnt	28.3	35.3	34.4	40.2	44.4	46.1	49.8	51.4	59.4	66.0	71.6
Ending stocks, mnt	2.1	4.5	2.1	4.7	4.6	1.8	2.8	7.6	13.3	14.6	13.3

Source: USDA

The key thing to note is that the domestic planted area and yields simply could not respond to this additional demand. In 2001, 9.5mn ha of Chinese land yielded 1.6 t/ha of soybean. A decade later, the land had declined to 8.3mn ha, while the yield had stagnated at 1.7 t/ha.

Consider the situation in the major grains – corn, rice and wheat. As Figure 19 shows, over the past five years, harvested area has increased about 3.7mn ha for corn, about 0.7mn ha for wheat and 1.4mn ha for rice. Further, a good part of that increase happened in the first two years – the last two years have seen a minimal increase in harvested area for rice and wheat. Similarly, yields for all three grains have seen only marginal improvement. While imports are currently negligible, we believe a repeat of what happened with soybeans is very much possible in the next few years.

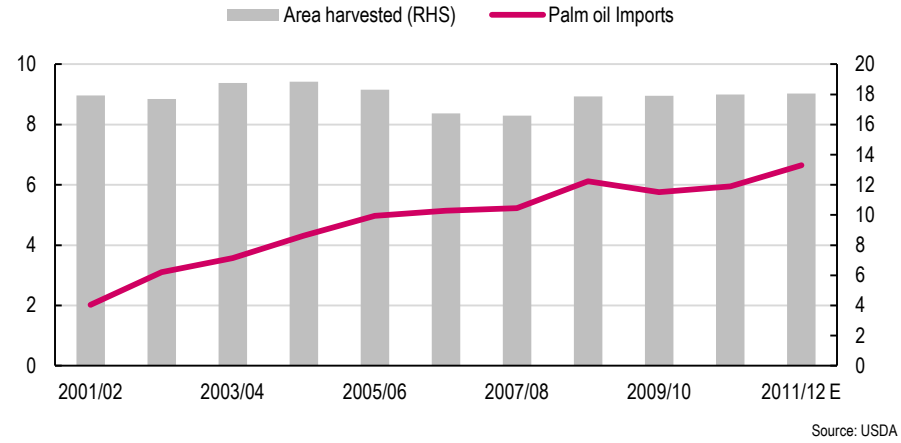
Figure 19: Statistics on corn, wheat and rice

	2007	2008	2009	2010	2011E
Corn					
Area, mn ha	29.5	29.9	31.2	32.5	33.2
Yield, t/ha	5.2	5.6	5.3	5.5	5.6
Wheat					
Area, mn ha	23.7	23.6	24.3	24.3	24.4
Yield, t/ha	4.6	4.8	4.7	4.7	4.8
Rice					
Area, mn ha	28.9	29.2	29.6	29.8	30.4
Yield, t/ha	6.4	6.6	6.6	6.6	6.6

Source: USDA

A similar scenario is being played out in oilseeds other than soybean. China's farmland is under pressure from growing urbanisation, and consequently, demand for cooking oil is being met less by domestic oilseeds (e.g. soybean and rapeseed) and more by imported palm oil.

Figure 20: China oilseeds (ex. soybeans) area harvested (mn ha) and palm oil imports, mnt



Source: USDA

While we limited the discussion in the preceding section to China, similar dietary changes are under way in a number of other emerging economies. As demand rises, internal constraints in a number of geographies are becoming apparent. In our view, this is a great opportunity for Latin America, the CIS and Africa. We see the example of the Cerrado as a harbinger of things to come, and expect more *Cerrados* to emerge – especially in Africa. Similar to how the Cerrado benefitted from China's growing appetite for soybeans, we believe Africa could benefit from increased global demand for corn, palm oil and other crops.

We conclude with what may seem a controversial view. China – and other key industrialising nations – will face a number of challenges in supplying their growing protein needs from domestic sources. Thus they will look to improve their strategic supplies from one of the three areas outlined previously – the Americas, the CIS and Africa. The Americas could certainly supply China with an additional 100mnt-plus of grains and oilseeds to satisfy those growing protein needs. However as we outline in the sections on food security and resource nationalism, an ever-increasing reliance on an undiversified group of supplier nations does not make strategic sense, and brings additional risks for the likes of China.

Meanwhile, the problem with additional supplies from the CIS is the nature of bottlenecks around places such as the Black Sea. According to estimates from Bloomberg, private and public investment in Russian port infrastructure will be approximately $600mn to end-2014, with potential additional throughput of almost 19mnt of grains. This is a big uplift, but perhaps insufficient to satisfy the wider demand picture. As experience demonstrates, export bans and quotas have been a regular feature in the CIS in recent years, therefore food security concerns are heightened, rather than eliminated.

This draws us to what we see as an inescapable view. China – and the world in general – does not just need Africa to satisfy its grain and oilseed demands; it also needs Africa to provide it with broader food security. Hence, Africa – a continent plagued by well-entrenched media images of famine, poverty and relentless food shortages – is required to give the world food security.

Food security

The first lesson of economics is scarcity: there is never enough of anything to fully satisfy all those who want it. The first lesson of politics is to disregard the first lesson of economics – Thomas Sowell

We will bankrupt ourselves in the vain search for absolute security – Dwight D. Eisenhower

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The World Health Organisation's World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life". The three components of food security are: 1) food availability; 2) food access – sufficient resources to obtain food; and 3) food use – appropriate use based on knowledge of basic nutrition and care as well as adequate water and sanitation. Our focus is on the first element – food availability – a global issue, in contrast with the national-level issues of food access and food use.

A question of surplus

"This natural inequality of the two powers, of population, and of production of the earth, and that great law of our nature which must constantly keep their effects equal, form the great difficulty that appears to me insurmountable in the way to the perfectibility of society."

Thomas Malthus, "An Essay on the Principle of Population"

We would not describe our outlook as neo-Malthusian. As noted, many commentators tend to express their views at extreme ends of the spectrum of opinion, when the truth probably lies somewhere in between. So, arguments of food security can typically be distilled into two opposing views: how can government intervention prevent a tragedy; or how can free markets resolve the issues. While we agree the planet faces serious challenges in feeding itself, we believe the difficulties will most likely be created by errors of human intervention. That is not to say we see ourselves as slavish free-marketers: to avoid the *dénouement* of Malthusianism will likely require foresight, clever thinking, some planning, a lot of co-operation and a fair bit of luck. Markets, too, will play a major part.

For example, we accept the endless (and consistently unlearned) lesson of history that every urbanised society eventually struggles to feed itself. Whether ancient Rome, the Mayan civilisation or the great drought of the 1870s, few urbanised societies can buy permanent food security. Stretched supply lines, weather disruption, wrecked soils, over-fertilisation, vast swathes of monocultures, mutating pests and so on all suggest a day of reckoning ahead unless questions are answered about how we produce, store, distribute and consume food; and how we organise the structures of the agriculture and food industries in the future.

The notion of a society's ability to feed itself has been around since urban settlements arose in the Sumerian valley. Ultimately, societies have been able to bring other factors into play (chemical fertilisers, insecticides, new seed strains, mechanisation, new planted areas, and so on) and these have allowed humans to multiply in both number and wealth. Thomas Malthus, in the early 19th century, wrote that population is eventually checked by famine, disease and war. He

observed that population would sooner or later outstrip agricultural production and drive living standards towards subsistence level.

Malthusianism made a return to prominence in the 1960s when Paul Ehrlich wrote "the battle to feed all of humanity is over ... In the 1970s and 1980s hundreds of millions of people will starve to death in spite of any crash programs embarked upon now." The Club of Rome – a global think tank, formed of people from academia, civil society, diplomacy and industry – in its 1972 report, “The Limits to Growth”, predicted economic and societal collapse in the 21st century.

The 2008 food crisis provided another opportunity for these concerns to regain their prominence in public debate. And this time, along with the familiar demons of over-population and resource depletion, we had new ones such as climate change and the rise of biofuels. Food riots in parts of the world were held out as harbingers of wider societal breakdown. Fortunately, the world was saved as a bigger harvest the following year tempered prices. However, was the shortage of 2008 a one-off situation created by droughts in Russia and Australia or was it one likely to recur with increasing frequency? We dismiss Malthus at our peril.

National food security

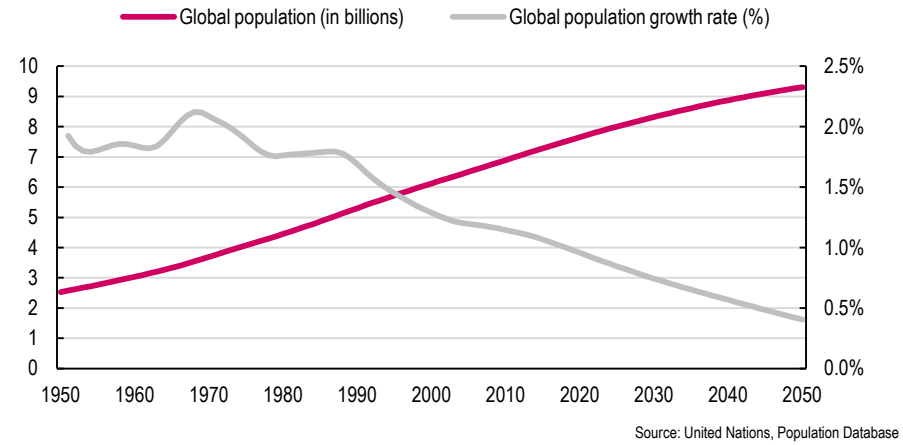
Looking at food security, it is rarely global worries that come to the forefront of people’s minds. Instead, the focus is narrower – on national food availability. Even if there is sufficient food on the planet, the distribution of that food might be uneven. As seen in 2008, export bans and import tariffs can severely hinder normal trade flows and exacerbate any crisis. So, countries try to achieve a level of self-sufficiency that does not put them at the mercy of the market. From an economic perspective, this is inefficient. However, it is inescapable.

The whole idea of food security feeds into some fairly deep-rooted human fears. That perhaps explains why the backdrop to food security is consistently Malthusian (i.e. pessimistic, and almost apocalyptic in nature). Of equal note, the arguments are also becoming part of what Galbraith termed, the “conventional wisdom” and part of ordinary discourse. Here we outline and assess the merits of the various arguments in detail.

Population growth, urbanisation and income growth

According to the United Nations (UN), the global population is set to increase from 6.7bn currently to about 9.3bn by 2050. It had reached 3bn by 1960, and took only a further 40 years to add 3bn more people. The next 3bn will be with us within the next 30 years. A near-50% increase in the world’s population over the course of the next 30 years, coupled with steadily rising incomes and increasing urbanisation will place significant strains on the world’s resources. Although the population growth rate is in long-term decline, this will not prevent the population rising significantly in the years ahead.

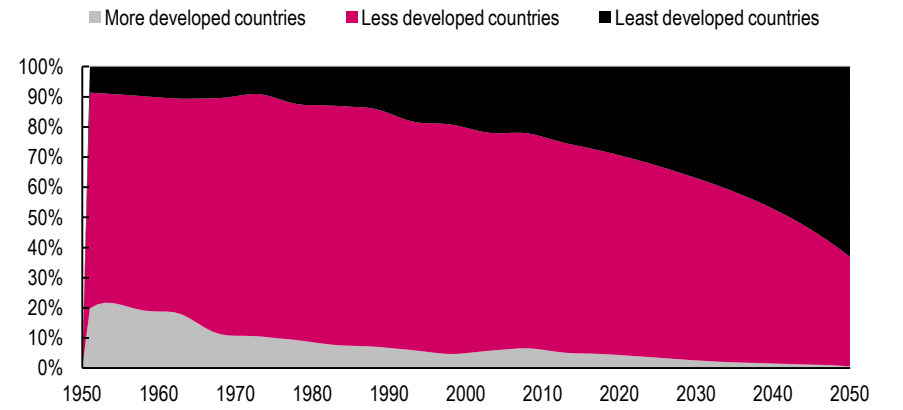
Figure 21: Global population and population growth rate



Source: United Nations, Population Database

Crucially, population growth over the following decades will be concentrated among developing countries and frontier markets. In fact, by 2030, low-fertility countries – which are mostly developed countries – are likely to experience a decline in population with all gains thereafter concentrated in the world's emerging markets.

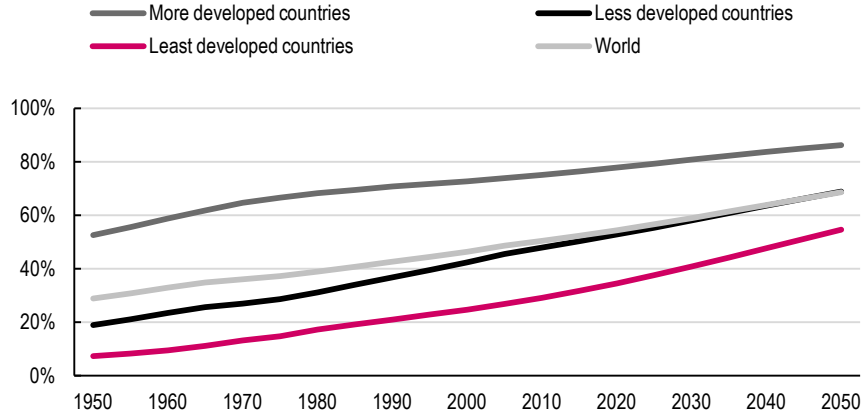
Figure 22: Contribution to global population increase



Source: United Nations, Population Database

Population growth is a sufficient catalyst in increasing the overall demand for food. However, a major driving force behind food consumption is increasing urbanisation. We look at this section in greater detail in the urbanisation section of this report but the following points are worth emphasising in relation to food security. This is especially prominent in developing markets where urbanisation rates are rising sharply. According to the UN some 69% of the world's population will be urbanised by 2050, in contrast with 51% now.

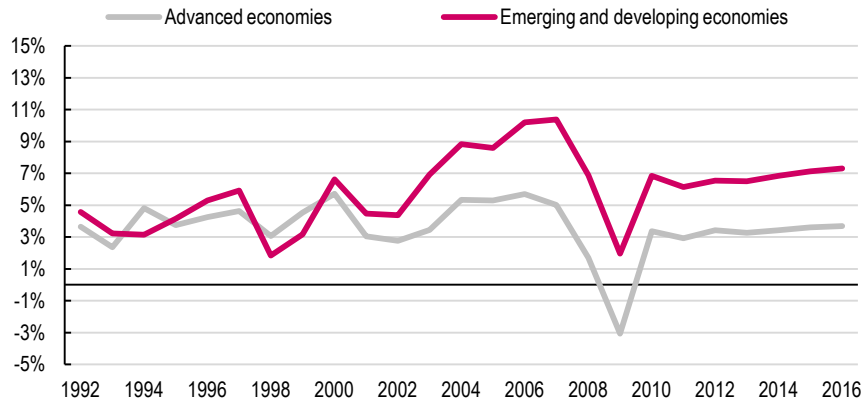
Figure 23: Urbanisation percentage (urban population/total population)



Source: United Nations, World Urbanisation Prospects

Simultaneously, income growth is also widely expected to be strongest in developing countries (see Figure 24).

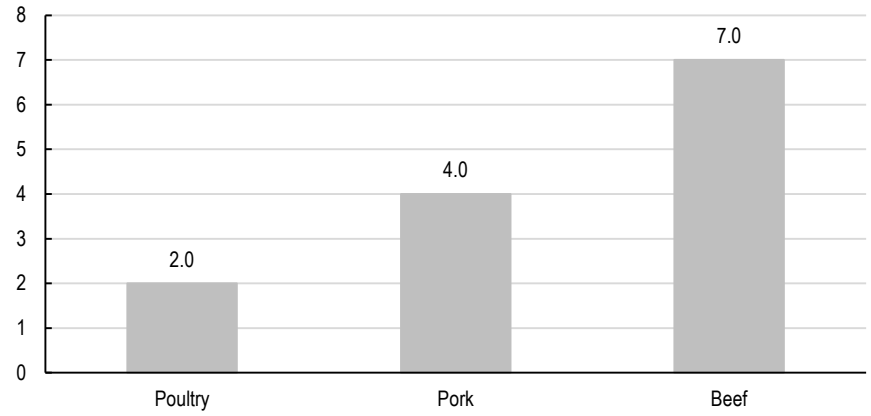
Figure 24: Per capita GDP growth rate (based on purchasing power parity)



Source: IMF, World Economic Outlook Database

Together, we believe these trends will lead to a gradual shift in diets towards increased protein content, in the form of meat and dairy products, which multiply the need for grains – it takes approximately 7 kg of feed grain to produce 1 kg of beef, 4 kg for 1 kg of pork and 2 kg of grains for 1 kg of poultry. This phenomenon is something we investigated in the earlier section focusing on China's protein demands. China is at the forefront of a trend that is happening across many emerging markets.

Figure 25: Kg of feed grain required to produce 1 kg of meat



Source: Doane, PotashCorp

One aspect of this increased protein intake – which is often ignored by commentators – is that the consumption of cereals as a source of nutrition can decline as well. That is, as consumers eat more meat this reduces the amount of cereals they consume directly. Thus, while the amount of grains indirectly consumed through meat increases, the amount of grains directly consumed declines. The balance of these two opposing grain consumption trends is not always positive – that is, higher protein intake need not always result in higher grain consumption, as seen in the case of Chinese consumers over the past two decades.

As Figure 26 shows, for both urban and rural dwellers, the per capita increase in indirect grain consumption through meat was less than half of the per capita decrease in direct grain consumption over 1990-2009.

Figure 26: Changing consumption patterns in China, kg/year

	1990	2009	Net change	Grain to meat conversion ratio	Net increase in grain use
Urban per capita consumption of					
Grain	130.7	81.3	-49.4		-49.4
Pork	18.5	20.5	2.0	4.0	8.2
Beef and mutton	3.3	3.7	0.4	7.0	2.9
Poultry	3.4	10.5	7.1	2.0	14.1
Net change in urban per capita demand for grain					**-24.2**
Rural per capita consumption of					
Grain	262.1	189.3	-72.8		-72.8
Pork	10.5	14.0	3.4	4.0	13.7
Beef and mutton	0.8	1.4	0.6	7.0	4.0
Poultry	1.3	4.3	3.0	2.0	6.0
Net change in rural per capita demand for grain					**-49.2**

Source: FAO, Renaissance Capital estimates

While the per capita values show a decline in total grain consumption, we do not assume this will be mirrored at an aggregate level in the future. First, although China's population growth is slowing and the population is ageing, the total population is still growing. Second, the decline in urban per capita direct grain consumption is showing signs of levelling off. It has, in fact, been rising, from a low of 75.9 kg in 2006. This means that in future, urban grain consumption – combining direct and indirect – will most likely increase even on a per capita basis. Finally, we have restricted our analysis to the use of grains for food. In other words, we have

omitted the impact of industrial uses of grain such as ethanol production, which will likely have an impact in the years ahead.

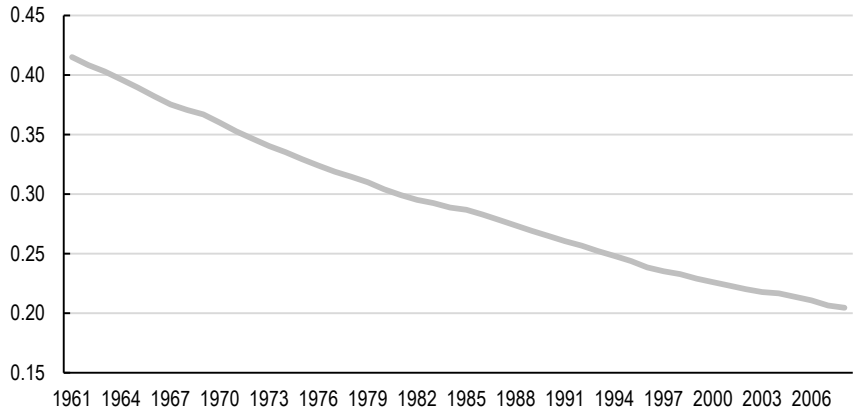
Taking all these factors into account, the FAO says that, to feed this larger, richer and more urban population, food production must increase by 70% (in value terms), with annual cereal production increasing from the current 2.1bnt to 3bnt, and annual meat production rising from the current 270mnt to 470mnt. While these required increments are huge, they do not constitute the full picture. We must also examine the supply side of the situation.

Shortage of resources

The most common argument regarding resource shortages contends that land and water are finite resources and are already fully utilised. Certainly, both are finite, but our concern is whether the finite quantity available for agriculture is sufficient for global requirements.

Arable land per capita has been on the decline for several decades now and is likely to continue to do so. This is often cited as an indicator that global food requirements are running ahead of the land available to supply those requirements.

Figure 27: Arable land per capita, ha

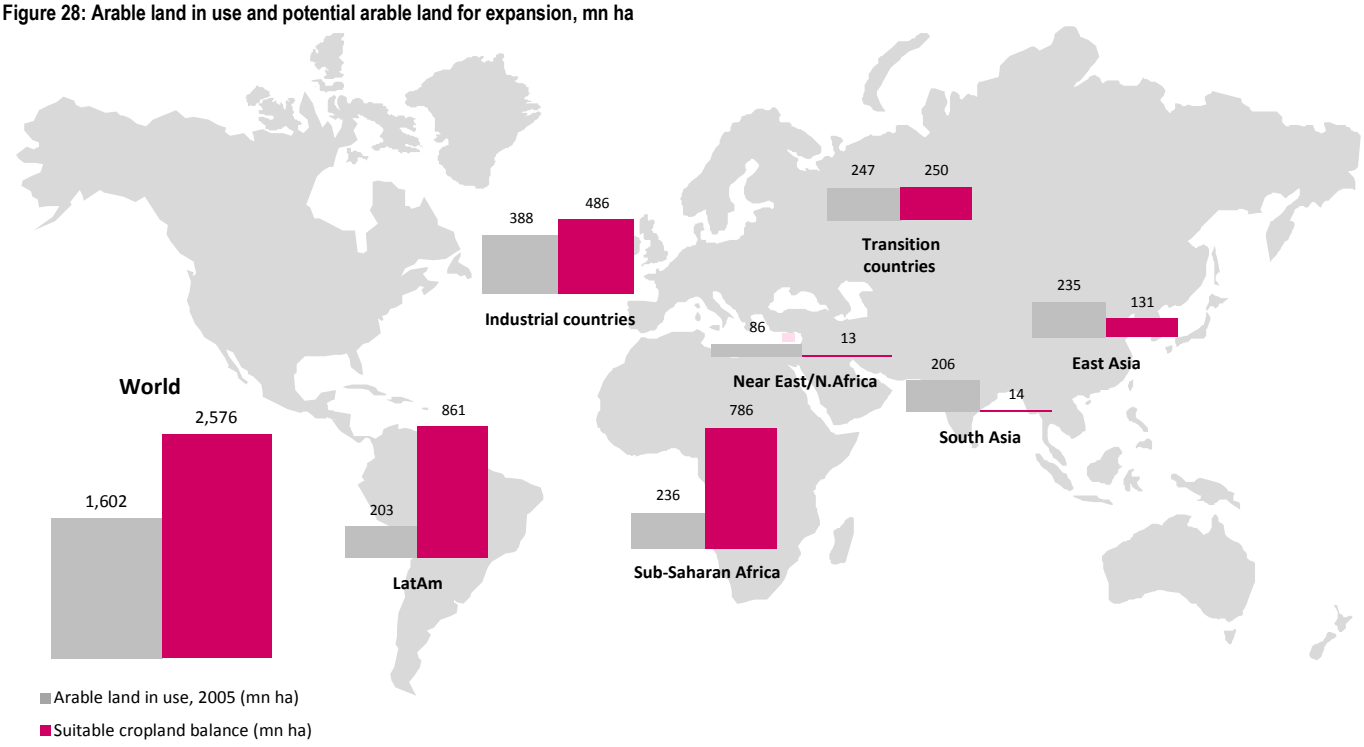


Source: FAO

However, looking at declining arable land per capita in isolation only proves that population growth is greater than arable land growth. It ignores the impact of the Green Revolution in the 1960s and 1970s, which transformed yields in developing countries. The focus needs to be on the land growth required for higher crop production – after accounting for yield growth and increase in cropping intensity – and to ask whether it is feasible.

Based on the Global Agro-Ecological Zone (GAEZ) study, about 4.2bn ha of land in the world is suitable to some extent for rain-fed agriculture. Of this, some 1.6bn ha is under cultivation currently while approximately 2.6bn ha is available for expansion. In other words, the amount of *unused* arable land is more than 1.5x the amount of currently used arable land.

Figure 28: Arable land in use and potential arable land for expansion, mn ha



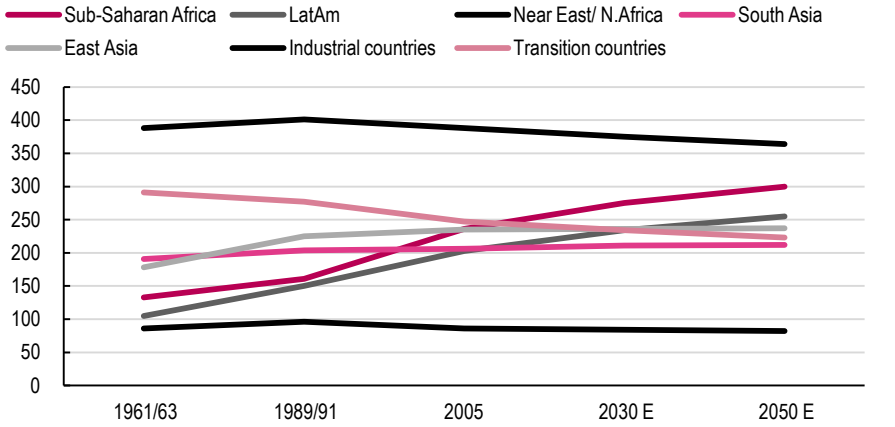
Source: FAO

Clearly, this suggests the potential land available for agriculture is considerable. However, there are caveats. It does not take into account the use of this land for other purposes such all other non-agricultural activities including forests, protected areas, human habitation and economic infrastructure. In addition, the GAEZ's definition of arable land is very wide (any land capable of supporting a single crop at a minimum yield). This suggests a potential mismatch between the amount of agricultural land available and the type of crops we actually want to grow on it. Finally, much of the unused land has other constraints such as ecological fragility, low fertility and toxicity and so on. This implies that using this land would require considerable investment, if indeed it is possible to farm it.

Although there are no estimates for how much arable land is still available once all these factors are taken into account, the sheer magnitude of the total availability should provide a reasonably high degree of comfort. An FAO study, *The Resource Outlook to 2050*, estimates that arable land worldwide will likely increase from 1.6bn ha to 1.67bn ha in 2050. In other words, of the total 2.6bn ha unused arable land available, only about 70mn ha is likely to be added to production by 2050. Therefore, by implication the world should be looking at significant yield enhancements in the years ahead.

Given the outcomes of the Green Revolution in the 1960s and 1970s, this is not something we should see as too much of a surprise. After all the Green Revolution was mostly about the transfer of technologies from developed-country laboratories and R&D centres to developing markets. If anything this process has accelerated in recent years through trade liberalisation.

Figure 29: Arable land in use – historical and projections, mn ha



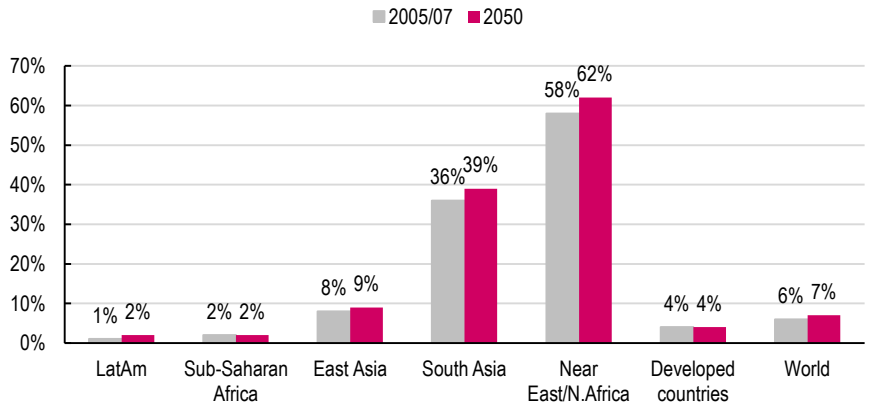
Source: FAO

Figure 29 highlights the development of arable land from 1960 and incorporating forecasts to 2050 across all geographies. While arable land in Latin America and Sub-Saharan Africa is expected to increase substantially, Near East, industrial countries and transition countries will likely see a decline. South Asia and East Asia will see minor increases. As we saw in an earlier chapter, the geostrategic needs of the Middle East and Asia will likely have a demonstrative impact on the acquisition of arable land in Africa and Latin America.

Shortage of water

The other resource often highlighted as a constraint on food production is water. Population growth and urbanisation undoubtedly puts pressure on water resources. However, this does not mean there are insufficient water resources for agriculture. A good indicator to emphasise this point is to calculate the "pressure on water resources due to irrigation" which is defined as the ratio of irrigation water withdrawal to renewable water resources. Figure 30 highlights this ratio across all geographies.

Figure 30: Irrigation water withdrawal/renewable water resources (2005/2007)



Source: FAO

At the global level, irrigation water withdrawal accounted for only 6% of the total renewable water resources in 2005/07. The FAO expects this ratio to reach 7% in 2050, which hardly seems a cause for worry. More importantly, the lowest levels of irrigation water withdrawal are seen in Latin America and Africa – precisely the regions where additional arable land resources are widely available.

One of the key concerns is not the overall lack of water availability. However, it is the wide differentials within regions that should be noted. For instance, one of the most prominent examples of internal water shortages is Northern China, which faces severe water restrictions, while Southern China has sufficient water resources. Across the country as a whole, a false impression of sufficiency could be created.

Thus, in an attempt to alleviate these strategic concerns, the Chinese government has embarked on an engineering project of huge dimensions: the South-North Water Diversion Project, a modern day version of Imperial China's Grand Canal, which will consume over $60bn of investment in the next few decades in an attempt to divert water from the Yangtze River to the parched regions of the North. Of course, with $3trn-plus in foreign exchange reserves, this is a project China can afford to support. African nations do not have the same advantage.

To understand the importance of water for crops, consider this: on a per hectare basis, most crops require about 5,000-8,000 t of water in a single growing season. This water can come from three sources, which are not mutually exclusive: rainfall, shallow groundwater, and irrigation. About 40% of the world's food production comes from irrigated fields and for some crops, such as rice, the share is nearly 100%.

In Sub-Saharan Africa, water availability for irrigation is not a problem. Instead it is the cost associated with irrigation. Estimates suggest that the cost of irrigating a hectare of land comes to around $10,000. This cost is roughly the same regardless of the method of irrigation – be it malnourished Africans operating treadle pumps all day, or a pressurised sprinkler and drip system, or a large-scale canal system with dam storage. The current land area equipped for irrigation in Sub-Saharan Africa is about 6mn ha, out of a total arable land area of around 240mn ha. If we wish to double the irrigation capacity, that is, bring an additional 6mn ha under irrigation – a modest goal – it would require a sum of $60bn i.e., an amount similar to China's South-North Water Diversification Project. Therein lies the problem.

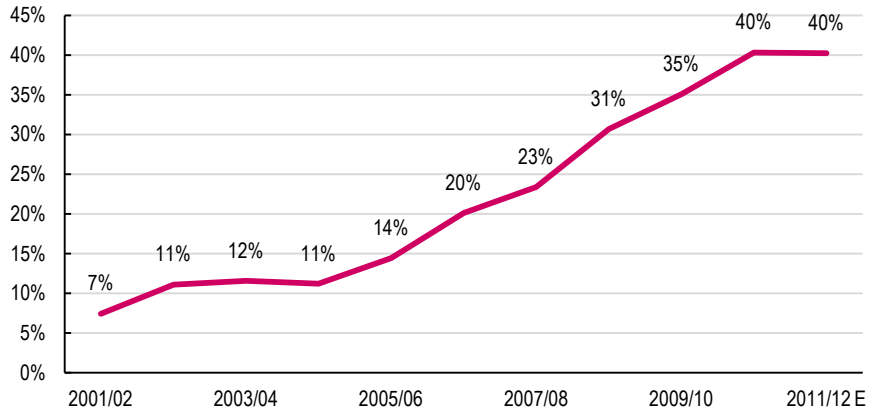
Growth of biofuels

The above arguments focused on the shortage of land and water, due to their finite availability. However, the growth of biofuels is presented differently, in that it is not about shortages per se, but about how they compete for land, and therefore food, resources. Corn can be used as food or as feedstock for ethanol. The food crisis of 2007-2008 was blamed on a number of factors and biofuels were one of the chief accused. Biofuel growth has been extraordinary in recent years and it is now estimated that the US's burgeoning requirements now require 10m ha of farmland to provide ethanol as a feedstock.

Given the desire for many governments to reduce their reliance on fossil fuels, we would expect this trend to continue. Thus, the *food vs fuel* debate has become

increasingly prominent in the past few years. Figure 31 (a commonly produced chart) highlights the share of US corn production that is, and is forecast to be, used to produce ethanol.

Figure 31: Share of corn used for ethanol production as a % of total corn production in the US



Source: USDA

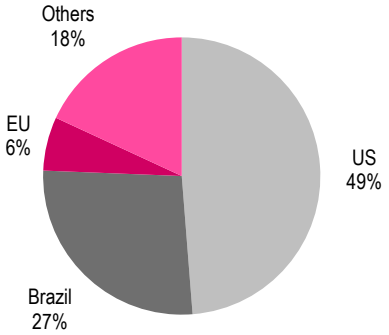
The problem with Figure 31 is that it demonstrates a nominal picture of how biofuels require land and thus implies that there is less land available for food. However, the growth of biofuels does not necessarily imply a trade off between food and fuel. That is, it does not demonstrate the overall availability of land; instead it simply demonstrates how the existing land is divided between the two.

The two major types of biofuels are bioethanol and biodiesel. Bioethanol, or ethanol, is usually used as a gasoline additive and occasionally in its pure form. The primary feedstocks are sugarcane and corn. The US and Brazil are the major producers of ethanol, accounting for 76% of global production in 2010. The US predominantly uses corn as feedstock while Brazil uses sugarcane. Although sugarcane is approximately 5-6x more energy-efficient than corn, subsidies in the US promote the use of corn as feedstock. Also, the climate in most parts of the US is not conducive for sugarcane cultivation. And it is this subsidised corn-based ethanol that comes in for most criticism in the food vs fuel debate – not only is it inefficient with less reductions in greenhouse gas (GHG) emissions, it is also a staple food crop.

Biodiesel is usually used as a diesel additive and is derived from vegetable oil. The primary feedstocks are oilseeds such as soybean, rapeseed, palm and sunflower. The EU is the major producer of biodiesel, accounting for around half of the global production, and uses rapeseed as the primary feedstock. Other major producers are Argentina, the US and Brazil.

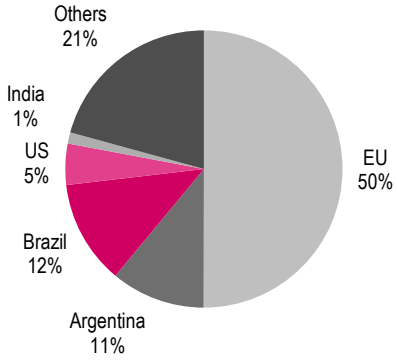
World ethanol production increased from 17bn litres in 2000 to 99bn litres in 2010 – a six-fold increase. Over the same period, biodiesel production jumped twentyfold, from 1bn litres to 20bn litres.

Figure 32: Ethanol production split (2010)



Source: OECD- FAO Agricultural Outlook 2011-2020

Figure 33: Biodiesel production split (2010)



Source: OECD- FAO Agricultural Outlook 2011-2020

While the growth of biofuels in the past decade has been impressive, our concern is with future growth. The key driver of future growth is likely to be government incentives and mandates. For instance, the US's Renewable Fuel Standard (RFS) calls for 136bn litres of renewable fuel to be used by 2022. Similarly, the EU's Renewable Energy Directive calls for its member states to replace 10% of transport fuels with renewable fuels by 2020.

While these mandates are clearly positive for biofuels, they are not positive for all biofuels. Put bluntly, not all biofuels are equal. Since the primary objective of using biofuels is to reduce GHG emissions associated with fossil fuels, GHG emission reduction is the criterion used to classify biofuels. For example, the GHG emission reduction achieved by substituting gasoline with ethanol derived from corn in the US is approximately 10-30%, while the reduction achieved by using Brazilian sugarcane-derived ethanol is about 86-90%. Hence, it would be more efficient to use ethanol derived from sugarcane, rather than from corn. This difference stems from factors such as the energy-efficiency of the crop, use of chemical fertilisers and agricultural machinery during cultivation, the use of energy for processing and transport and so on.

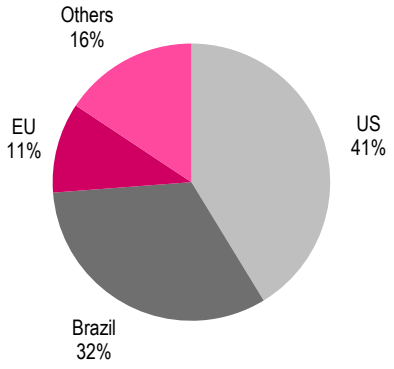
Recognising this need to look at GHG emission, most biofuels policies have additional criteria in addition to volume mandates. In the US RFS, advanced biofuels must account for 79bn litres, or about 58% of total biofuel output. In this context, advanced biofuels are those that achieve a 50% reduction over baseline lifecycle GHG emissions. Furthermore, all biofuels must achieve a minimum GHG emission reduction of 20%. Similarly, the EU's directive requires biofuels to demonstrate GHG savings of 35% versus fossil fuels, with the savings threshold rising to 50% by 2017 and 60% by 2018.

These additional criteria will have the effect of shifting biofuel production away from inefficient feedstocks such as US corn and palm sourced from land where rainforests previously stood. Instead, the use of efficient feedstocks such as Brazilian sugarcane and perhaps Jatropha grown on marginal land will increase. Furthermore, the production of biofuels such as cellulosic biofuels and algae fuels would increase. Together these changes would reduce the pace of growth of agricultural land used for biofuels, thus weakening the primary argument in the food vs fuel debate. To get an idea of the scope of reduction possible, consider the following – the US Department of Energy estimates that if algae fuel were to replace

all the petroleum fuel in the US. It would require about 3.9mn ha, or about half of Scotland, or less than an eighth of the US corn harvested area in 2010/2011.

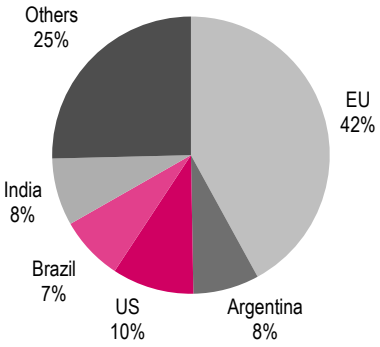
To get some sense on the numbers involved, let's look at the growth forecasts for ethanol and biodiesel. According to the OECD-FAO Agricultural Outlook 2011-2020, global ethanol production will likely increase from 99bn litres in 2010 to 155bn litres in 2020, while global biodiesel production will likely increase from 20bn litres to 42bn litres over the same period. Similar to the current situation, the US and Brazil will likely account for the bulk of global ethanol production, and the EU will likely account for the largest share of global biodiesel production.

Figure 34: Ethanol production split (2020)



Source: OECD- FAO Agricultural Outlook 2011-2020

Figure 35: Biodiesel production split (2020)



Source: OECD- FAO Agricultural Outlook 2011-2020

For our analysis, we look to the area of land required to satisfy these production numbers. Unfortunately, this is not easy, given the various feedstocks that can be used with differing harvest yields and biofuel extraction yields. For example, the volume of ethanol that can currently be produced from a hectare of land is approximately 3,747 litres from US corn and 7,495 litres using Brazilian sugarcane. Meanwhile others, such as algae or switchgrass-derived biofuels would not require arable land. To get around these problems, we have adopted an extreme scenario, whereby all biofuels in 2020 are produced from agricultural crops, thus placing maximum stress on arable land.

Figure 36 illustrates the additional land required globally in 2020 for ethanol production based on OECD-FAO forecasts. We have assumed that all ethanol in the US is from corn and in Brazil from sugarcane. In the rest of the world, feedstocks vary, but we have assumed a yield similar to that of corn to maintain a conservative approach. Under these assumptions, additional land required globally for ethanol production is 11.7mn ha.

Figure 36: Additional land requirement for ethanol in 2020 – extreme scenario

	2010	2020E	
US Ethanol production, mn l	48,470	63,961	
Corn used for ethanol, bu	5,020	6,624	
Ethanol yield, l/bu	9.7	9.7	
Corn yield, bu/acre	157.1	157.1	
Ethanol yield, l/acre	1,517	1,517	
Ethanol yield, l/ha	3,747	3,747	
Land required, mn ha	12.9	17.1	
Additional land required			**4.1**
Brazil ethanol production, mn l	26,720	50,393	
Ethanol yield from sugarcane, l/ha	7,495	7,495	
Land required, mn ha	3.6	6.7	
Additional land required			**3.2**
Global ethanol production, mn l	99,423	1,54,962	
Rest of the world ethanol production, mn l	24,233	40,608	
Ethanol yield, l/ha	3,747	3,747	
Land required, mn ha	6.5	10.8	
Additional land required			**4.4**
Additional land required globally			**11.7**

Source: USDA, OECD- FAO Agricultural Outlook 2011-2020, Renaissance Capital estimates

A similar calculation for biodiesel is shown in Figure 37. We have assumed that the EU uses rapeseed as a feedstock while Argentina, Brazil and the US use soybeans and sunflower as feedstock. For the rest of the world – primarily India, Indonesia and Malaysia – we have assumed that the feedstocks used are Jatropha and palm. Under these assumptions, additional land required globally for biodiesel production is 18.8mn ha.

Figure 37: Additional land requirement for biodiesel in 2020 – extreme scenario

	2010	2020E	
EU Biodiesel production, mn l	9,920	17,610	
Biodiesel yield from rapeseed, l/ha	954	954	
Land required, mn ha	10.4	18.5	
Additional land required			**8.1**
Argentine, Brazil and US biodiesel production, mn l	5,536	10,373	
Biodiesel yield from soybeans and sunflower, l/ha	645	645	
Land required, mn ha	8.6	16.1	
Additional land required			**7.5**
Global biodiesel production, mn l	19,826	41,917	
Rest of the world biodiesel production, mn l	4,370	13,934	
Biodiesel yield from Jatropha and palm, l/ha	2,936	2,936	
Land required, mn ha	1.5	4.7	
Additional land required			**3.3**
Additional land required globally			**18.8**

Source: OECD- FAO Agricultural Outlook 2011-2020, Renaissance Capital estimates

Thus, to produce biofuels solely from agricultural crops would likely require an additional 30.5m ha land by 2020. Note that this is an extreme scenario and it relies on the following assumptions: no improvements in crop yields and no uplift in ethanol or biodiesel extraction yields. With improvements in technology, it is highly likely that yields will increase, and consequently reduce land requirements.

Furthermore, as noted, both the US and EU require a certain percentage of biofuels to come from advanced biofuels – i.e. from sugarcane, algae or cellulose – which would again reduce arable land requirements. Similarly, Jatropha for biodiesel can grow on marginal and degraded land, further reducing arable land requirement. Finally, biodiesel from recycled vegetable oil or animal fat would have no land requirements.

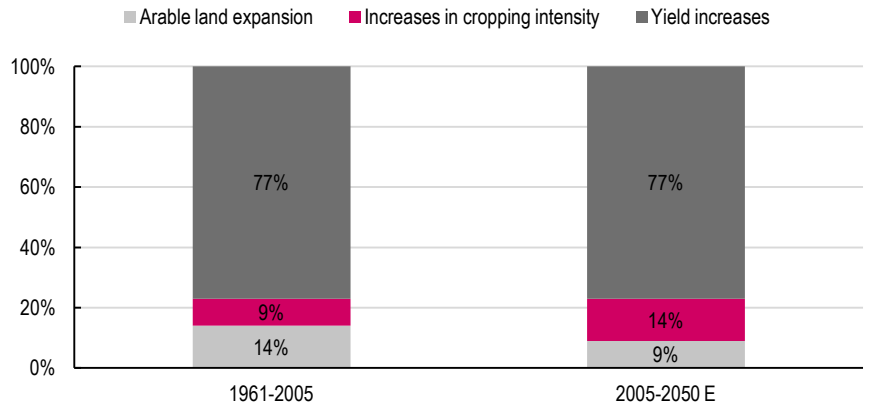
To get a more realistic picture, consider the US and EU biofuel mandates. The US requires 58% of total biofuels in 2022 to be advanced biofuels, which are most likely to be based on sugarcane, algae and cellulose. Similarly, the EU mandate requires GHG savings of 60% by 2018, and this is unlikely to be achieved with agricultural crop as feedstocks. Based on this, we can make a conservative assumption that only about 50% of total biofuel production in 2020 will come from agricultural crops. While biofuel from algae and cellulosic feedstocks will likely require land, it need not be arable land. Thus the arable land requirement of 30.5mn ha that we have calculated above would be halved to 15.3mn ha.

To put this in perspective, the additional land requirement of 15.3mn ha represents a little less than 1% of the total arable land in use globally. It is about 8% of the potential arable land available for expansion in Brazil, or about 19% of the potential arable land available for expansion in the Democratic Republic of Congo. In summary, Mark Twain was only half-right when he said, “Buy land, they don’t make it anymore.” He forgot to add that they made quite a lot of the stuff in the first place.

Yield-growth potential

The three sources of growth in crop production are arable land expansion – bringing more area under production; growth in cropping intensity – increasing multiple cropping and shortening fallow periods; and yield increases. As Figure 38 shows, the FAO expects yield increases to continue to be the major source of growth in crop production.

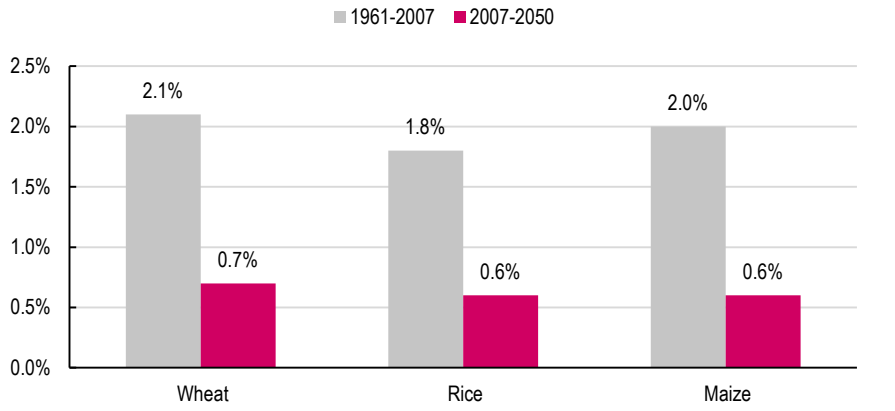
Figure 38: Sources of growth in global crop production



Source: FAO

In terms of growth in yields, this translates to an annual growth that is about one-third of what was achieved in the past 50 years.

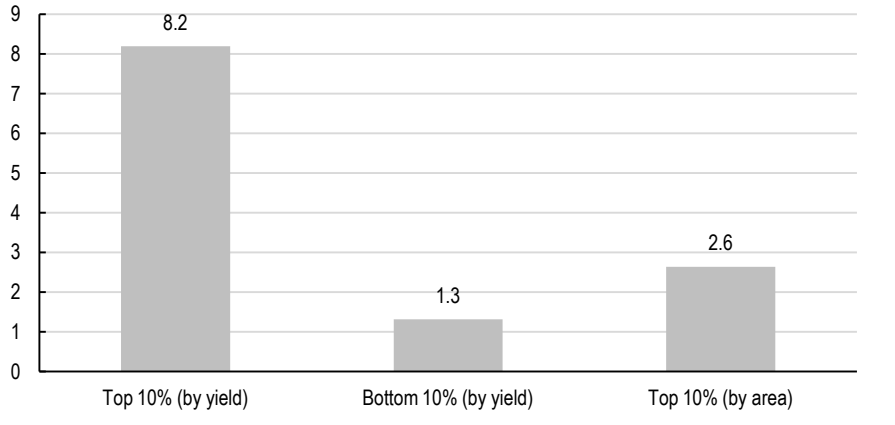
Figure 39: Annual growth in yields



Source: FAO

To see if such yield increases are feasible, let us first look at current yields across countries. For the purposes of this analysis, we will focus on wheat. Broadly, however, the results will likely be similar for most other crops. In 2009, Belgium's wheat yield was 9.3 t/ha, while Kenya's was just about a 1 t/ha. If we consider only those countries that have over 50,000 ha under wheat cultivation, the top 10% had an average yield of 8.2 t/ha while the bottom 10% had an average yield of 1.3 t/ha – i.e., nearly one-sixth. Another group of countries to look at is those with the largest areas under cultivation, as any increase in their yields would have a major impact on production. The average wheat yield for the top 10% of countries, according to area under wheat cultivation, is 2.6 t/ha – nearly one-third of that in the top-yielding countries.

Figure 40: Wheat yield distribution (2009)

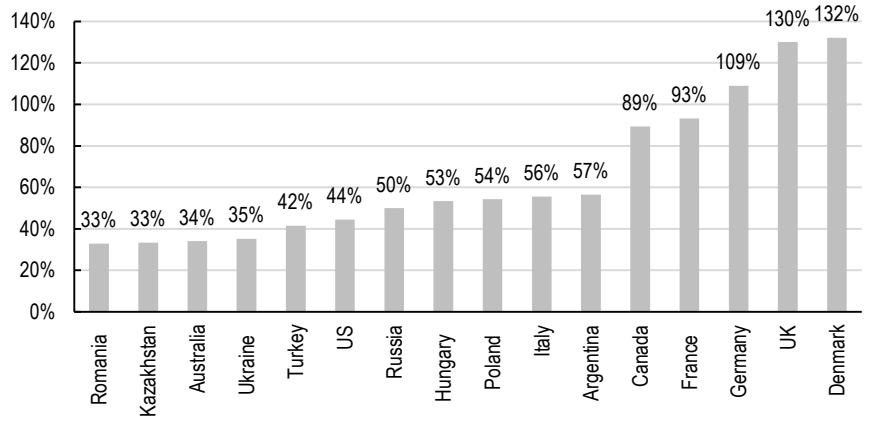


Source: FAO

These vast differences in yields between countries would seem to indicate that further growth in global yields should be attainable, if the laggard countries could simply catch up with the leaders. However, not all these yield differences can be bridged. One part of this difference is due to the varying agro-ecological environment – all other things being equal, wheat yields are likely to be higher in the fertile Black Earth region of Ukraine than in the arid steppes of Mongolia. The yield difference, stemming from these non-transferable factors, cannot be bridged.

However, other factors, such as crop management practices, can be transferred. The yield difference arising from these factors can be bridged if economically feasible and it is the reduction of this difference, which will likely contribute to the growth in global average yields. Figure 41 shows the ratio of actual average wheat yields between 2003-2007 and the agro-ecologically attainable average wheat yields for a few countries.

Figure 41: Actual average wheat yield (2003-2007)/average attainable wheat yield (%)



Source: FAO

For most countries, the actual wheat yield is a small fraction of the attainable yield, with a few countries from the EU demonstrating long-term outperformance. This difference means that there is a significant scope for improvement in yields. However, a few caveats are in order. To obtain these higher yields requires large levels of investment coupled with changes in crop management practices. It follows that this would increase the cost of production, and be justifiable only in an environment of higher prices.

To conclude, yield increases are fully capable of being the primary driver of growth in crop production and driven by key areas. Moreover, all the yield increases noted above are for the existing plant varieties and based on existing farming practices. Any improvements such as, genetically modified varieties that are higher yielding, drought- or pest-resistant and so on, would surprise on the upside.

Climate change

Although scientific consensus on the need to mitigate the effects of anthropologically induced climate change has been part of conventional wisdom for a while, political consensus is far from reality. The implication here is that mitigating steps are unlikely to be adequate or timely. Accordingly, we think it is appropriate to consider the effects of climate change on agriculture.

Agriculture is highly vulnerable to climate change. The failure of many societies throughout history has been driven by the impact of climate change.

Seasonal changes in temperature and rainfall can affect yields, pests, weeds, growing seasons, planting and harvesting schedules and land suitability. Although there will also be a positive effect on a few crops in a few regions where the climate becomes more suitable for agriculture, on a global level the effect may well be negative. Unfortunately, these effects are hard to quantify, especially on a global scale.

According to the International Food Policy Research Institute's October 2009 report, *Climate Change: Impact on Agriculture and Costs of Adaptation*, "agriculture and human well-being will be negatively affected by climate change". More specifically:

- Yields of major crops will decline in developing countries especially South Asia.
- Crop production will decrease considerably in South Asia and Sub-Saharan Africa. For instance, in South Asia, relative to a no-climate-change scenario, rice production could decline by 14%, wheat by 44-49%, and maize by 9-19%.
- Latin America would see minor gains for most crops, although this would be easily offset by losses in the rest of the world.

The Intergovernmental Panel on Climate Change (IPCC) also draws similar conclusions in its Fourth Assessment Report of 2007.

- In Africa, climate variability and change will likely severely compromise agricultural production and access to food.
- By the mid-21st century, in East and Southeast Asia, crop yields could increase up to 20%, while in Central and South Asia, yields could decrease by up to 30%.
- In Southern Europe, climate change would likely reduce crop productivity. In Northern Europe, the initial effect of climate change was projected to increase crop yields.
- In drier areas of Latin America, productivity of some important crops would likely decrease.

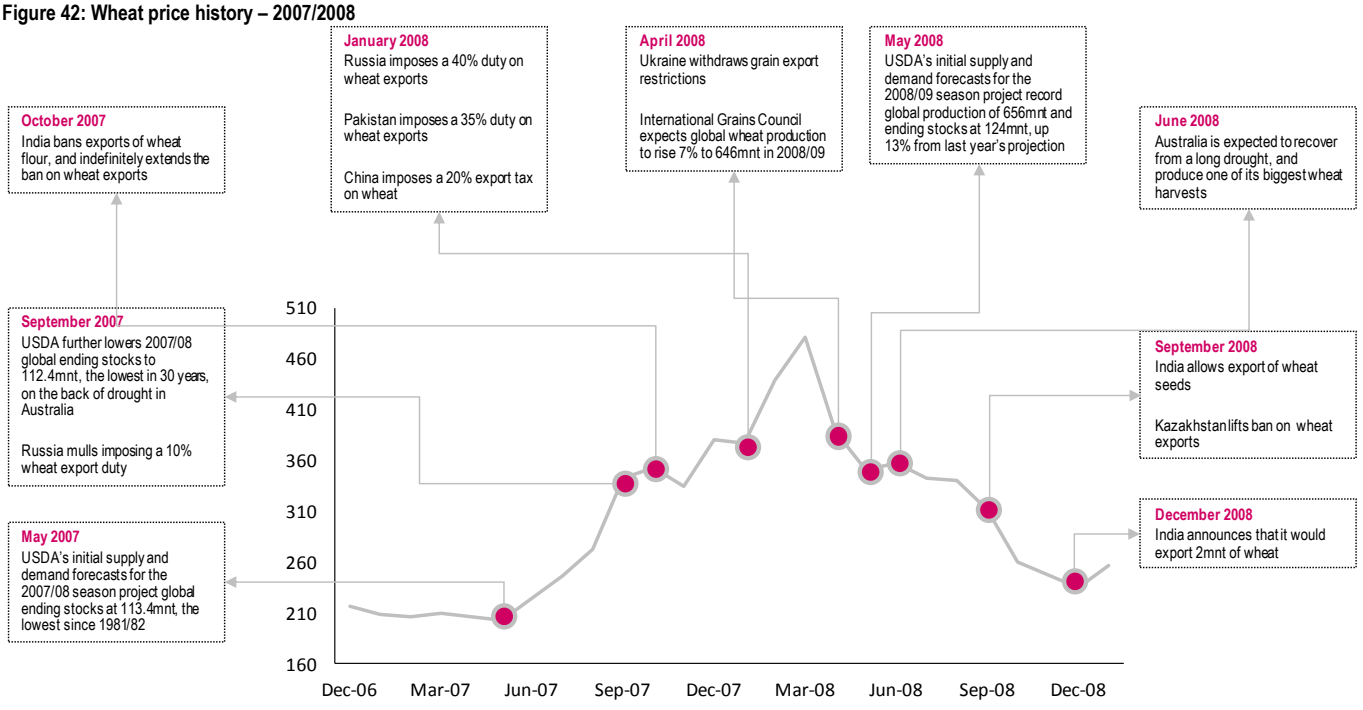
Setting aside precise numbers, the conclusion to be drawn is that climate change, if unmitigated, can affect food security in a substantial manner. However, its effects are not in the near future, and some mitigation efforts are under way. Hence, we would be able to get a more specific understanding of its impact only over time.

The practical politics of food security

The narrower aspect of food security that we have already touched on (i.e. national food security), is what drives the politics of food security. This came sharply into focus during 2007-2008, when the prices of agricultural commodities across the board rose sharply. Exporting countries restricted exports through bans, quotas and taxes, leading to further increase in prices as trade volumes shrank.

Figure 42 highlights the history of wheat prices during that period. Clearly, the dynamics of supply and demand are a major determinant of price. However, more interestingly, export restrictions have also played an important part in price movements. Other commodities, such as rice, have witnessed similar export restrictions and subsequent price increases.

Figure 42: Wheat price history – 2007/2008



Source: Renaissance Capital

While the global price may have increased as a consequence of these actions, domestic prices in countries that imposed restrictions saw only modest price rise. This is an important point as it highlights the distorted incentives and the inability of importing and exporting countries to align their interests. For example, as noted by the FAO, the imposition of a ban on rice exports by Vietnam (in September 2007) and India (November 2007), substantially reduced global trade and increased prices. The Philippines, a major rice importer, imported rice at $700/t in April 2008 and at more than $1,100 per tonne in May 2008, while the average price in 2007 was $332.4/t. In contrast, domestic prices in India saw much smaller increases. In May 2008, rice was trading at $367/t in India, only a 7% increase from November 2007.

Interestingly, Vietnam saw domestic rice price increasing 63% over the same period to $670/t, despite the export restrictions. The reason for that was a lack of faith in the government's ability and willingness to maintain adequate stocks, leading to

panic buying and hoarding. This highlights how difficult it is to stabilise domestic prices when there is a global crisis, and that it is not just a matter of restricting exports.

To avoid being exposed to the diktats of agricultural exporters, importing nations scrambled to ensure their food security. One possible strategy, which may be employed by the likes of China and various Middle Eastern countries, is land acquisition in places such as Africa and Latin America. The logic, seemingly, is that, since the importing countries do not have spare land or resources such as water, they are acquiring it in places that have these resources, thus guaranteeing food security.

We see this differently. Land outside your borders does not purchase any security. If the host country imposes an export ban, it would be universal. Mere ownership of land would not grant exemption from an export ban – defeating the very purpose of owning that land. Why, then, are countries pursuing such a strategy?

Well, for a start, they aren't, really. Investment by foreign governments (or their agents) in Asia and the Middle East has actually been marginal. As we highlight in the section, *Runners, riders and the open field*, although there have been numerous announcements of investments, very few have materialised. Moreover, in proportion to the total land available for expansion in Africa, these projects are minuscule. In addition, how much of that marginal investment has been due to food security concerns and how much of it has been due to the recycling of trade surpluses or petrodollars. How much of it comes down to a natural investment diversification strategy? After all, such a strategy fits in with a wider theme that we believe is playing out – the shift in food production towards low-cost producers (as seen in manufacturing and IT services over the past few decades).

Another emerging approach to food security by this type of investor is the establishment of a trading house – as followed by Abu Dhabi Sources. However, we see the same problem with this as with buying land. Ownership does not necessarily equal possession. For instance, if the grain owned by Abu Dhabi sources is stored in elevators overseas, it does not improve food security in any way. We believe this, too, has more to do with investment diversification than food security.

More importantly, as witnessed several times in recent months, the establishment of offtake agreements across Africa is proving difficult to implement. Many governments and companies are reticent about the establishment of these agreements in nations where periodic food shortages are the norm. Clearly, we are still in the earliest stages of development of this model, which harnesses these trade flows; therefore, it is possible that offtake agreements become more prominent over time. If they do become more prominent as a method of ensuring food security, we believe it more likely that they will become widespread and diversified across the continent. After all, ensuring one's food security at the expense of someone else's food security becomes little more than a short-term political fix, which will deliver little more than long-term political problems.

Urbanisation as the crucible of growth

Burn down your cities and leave our farms and your cities will spring up again as if by magic; but destroy our farms and the grass will grow in every street of every city in the country – William Jennings Bryan

A great city is not to be confounded with a populous one – Aristotle

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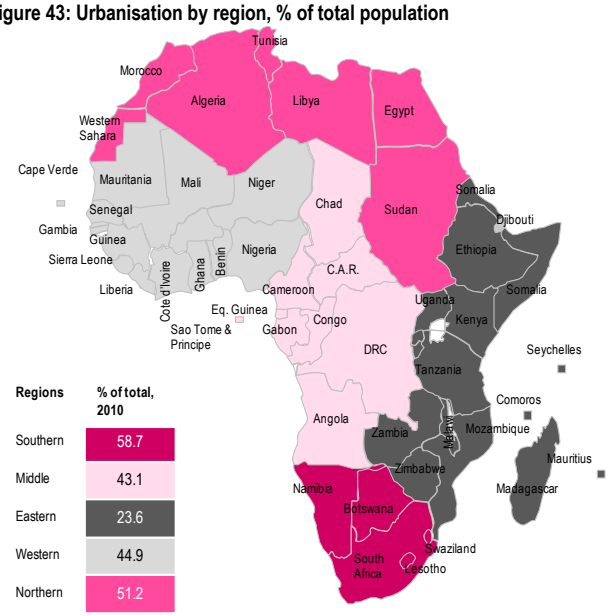
Africa's population will increase by 60% over the next four decades and the urban population, in particular, will triple to 1.23bn, according to the UN-Habitat organisation. Africa is the world's fastest urbanising region. In 1990, one-third of Africa's population was urbanised. Today, four in every 10 Africans live in urban areas and by 2025 almost half the continent's population will be urbanised, according to UN-Habitat. We note that urban growth is not largely due to the phenomenon of rural-urban migration. Rural-urban migration only explains 40% of urban growth rates, while natural growth (higher birth rates over death rates) explains 60% of growth.

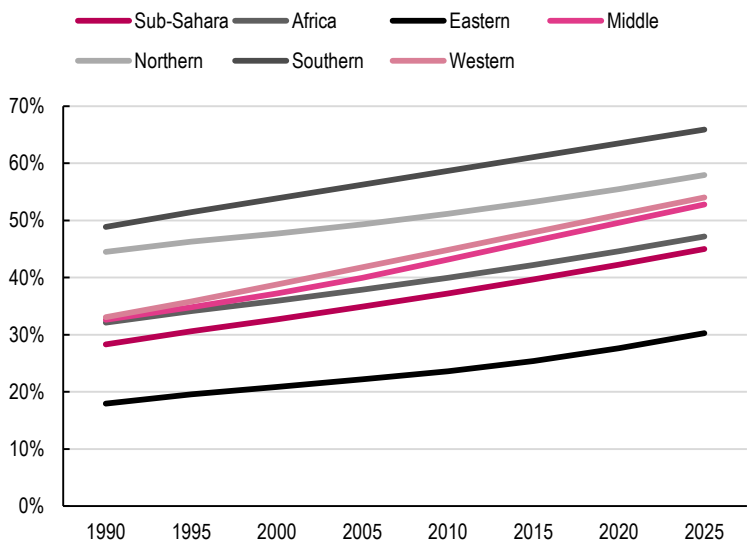
Southern Africa is the continent's most urbanised region, followed closely by Northern Africa (see Figure 43 and 44). Approximately 60% of Southern Africa's population lives in urban areas today, compared with half of Northern Africa's population. The least urbanised region is East Africa, where only a quarter of the population lives in urban areas.

Figure 43: Urbanisation by region, % of total population



Source: UN-Habitat, Renaissance Capital

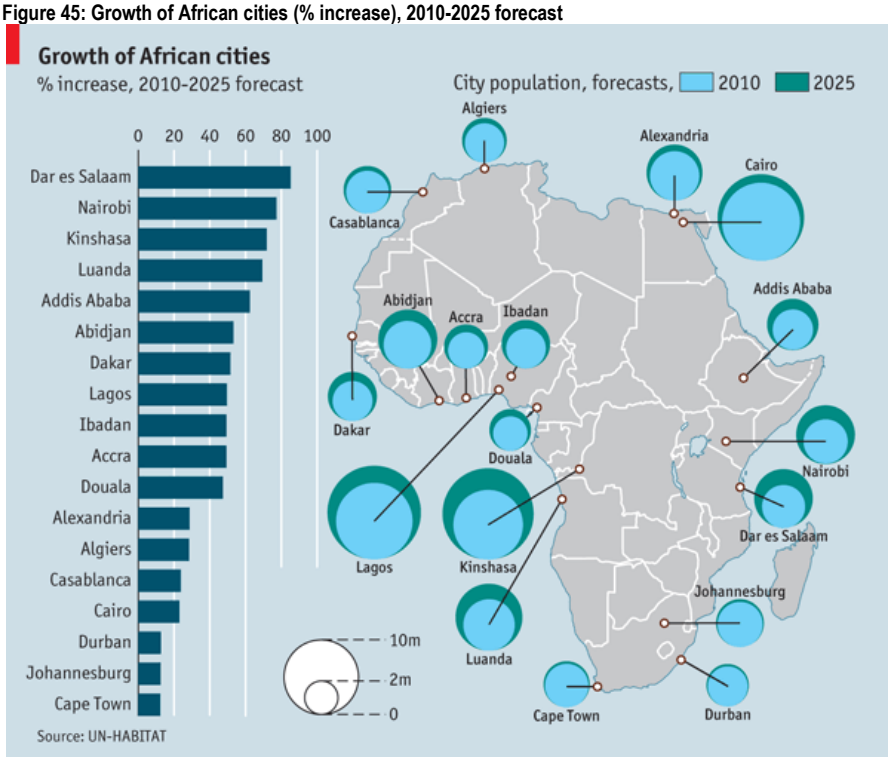
Figure 44: Urban population by region, % of total population



Source: UN-Habitat

When most of Africa was colonised by Europeans in the late 19th century, the continent had almost no urban population. Colonial, commercial and administrative politics catalysed urbanisation. The primary objective of the colonists was to export cash crops and minerals from their respective colonies to Europe. To this end, harbour towns were established and railway lines built to transport raw commodities from inland areas to these coastal ports. Central administration functions were often placed in the port towns, which over time emerged into significant urban areas. This explains why most of Africa's biggest cities are located along its lengthy coastline (see Figure 45).

Figure 45: Growth of African cities (% increase), 2010-2025 forecast



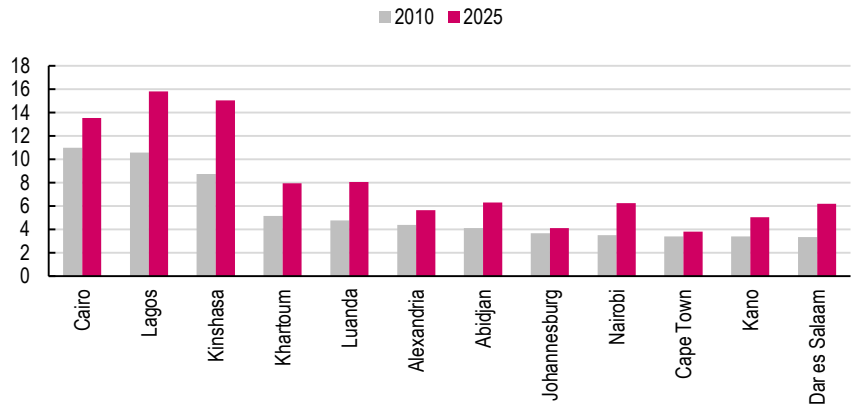
Source: The Economist, UN-Habitat

When African countries began to emerge as independent nation states, free of former colonial powers, several established centrally planned economic systems. In addition to governments' role in the provision of social and physical infrastructure and delivery of social services, they took on a more prominent role in the development of industry and the creation of employment. Centralisation resulted in powerful and unwieldy governments. It also meant economic opportunities often stemmed from urban areas – especially capital cities – as these were closest to the seats of power. This, in turn, resulted in a significant concentration of investment in urban areas. By one estimate, Nigeria's urban areas have received 80% of total investment in the modern era. Skewed investment patterns such as these explain the increase in urbanisation in the early days of independence. In some instances, new cities were built, with the intention of decentralising power, and investment. For example, Lilongwe (Malawi), Yamoussoukro (Cote d'Ivoire) and Abuja (Nigeria) all arose as new capital cities. While none of these cities can be classified as a megacity, all have eased pressure on the respective countries' other urban centres.

The histories of South Africa and Botswana largely explain why Southern Africa is the most urbanised region in Africa. Mining towns in both countries, and ports in South Africa, pulled labour towards urban areas. Moreover, the establishment of large-scale commercial farms by white farmers, which resulted in the displacement of indigenous people from the land, intensified urbanisation. Those who failed to gain employment on these large farms were compelled to work marginal land or migrate to urban areas. Moreover, the removal of the laws that restricted free movement of non-whites in the early 1990s catalysed a second wave of urbanisation. The rate of urbanisation in Southern Africa is slowing, which explains why the continent's biggest cities in 2025 will not be in the region. According to UN-

Habitat, Lagos and Kinshasa will have the biggest populations in 2025, as Figure 46 highlights.

Figure 46: Africa's most populous cities in 2010 and 2025, mn



Source: UN-Habitat

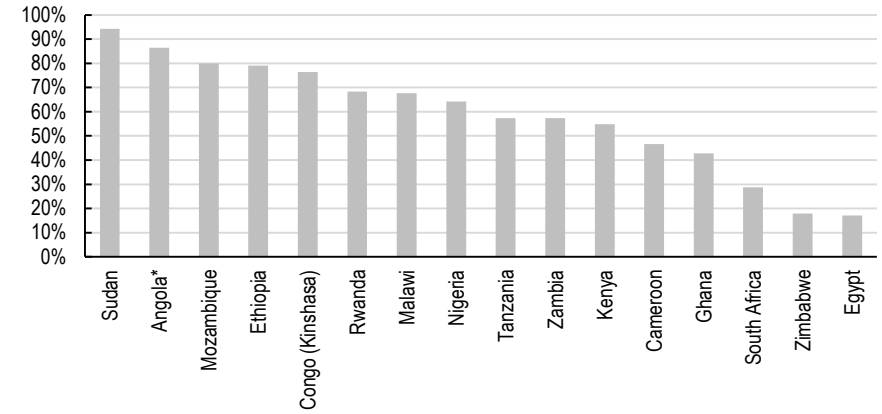
North Africa is the second most urbanised region in Africa. The location of the region's urban areas on the coast and its relatively high rate of urbanisation are both due to the fact that outside of the coastal area, the terrain in North Africa is desert. Aside from the natural pull factor of the port towns for North African migrants, the coastal area is also significantly more habitable.

East Africa is the least urbanised region in Africa. The fact that most of the region's countries are resource-light and are largely agricultural-based economies partly explains the smaller share of the population that is urbanised, in our view.

Infrastructure pressures

Rapid urbanisation implies increasing pressure on resources, particularly on physical and social infrastructure such as housing, roads, health and education facilities. Africa's growing urban populations are placing enormous pressure on housing stock. Luanda, for instance, is a city that was built for 500,000 people and now has about 5mn residents. As most migrants tend to be in the low-income bracket, they increase the pressure on infrastructure and social services in low-income areas – particularly slum settlements. About 72% of Africa's urban dwellers live in slums, according to the UN, compared with 46% for Asia and just over 30% for Latin America and the Caribbean. The African countries with the highest proportions of the urban population dwelling in slums include Sudan (prior to the secession of South Sudan), Angola and Mozambique, where 94%, 87% and 80% respectively of the population are slum dwellers. Urban areas that are dominated by slum dwellers are a clear indicator of high income-inequality.

Figure 47: Africa's slum population, % of the total urban population (2007)

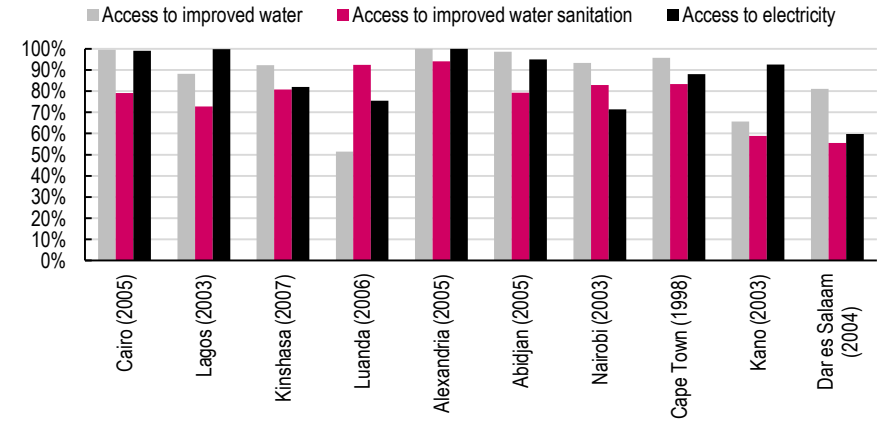


Note: * - year 2005

Source: UN-Habitat

Swelling urban populations require a concomitant increase in social and physical infrastructure to prevent the existing infrastructure from coming under unbearable pressure. In Africa's most populous cities, households have seen less of an improvement in water sanitation than they have in water supply and electricity (see Figure 48). More work therefore needs to be done to improve sanitation facilities in Africa's urban areas. The big cities that have seen the least improvement in access to utilities are Dar es Salaam (Tanzania), Kano (Nigeria) and Luanda (Angola).

Figure 48: Urban households with access to improved water, sanitation and electricity, % total



Source: UN-Habitat

Urbanisation and food security

As noted, the influx of rural migrants into urban areas is not the biggest contributor to the ever-increasing population growth of African cities; urban birth rates have a bigger effect. However, concerns arise that rural migration leads to a decline in small-scale food producers and this may undermine food security given that most urban dwellers are net food buyers.

Having looked at the issue of food security, we turn to its relationship with urbanisation. Consider the notion of food security from the perspective of four dimensions, as defined by Marutschke (2009): *availability*, *stability*, *safety* and *access*. The migration of small-scale food producers into Africa's cities raises the question of food availability in the future. As Africa moves towards the 2025 threshold when half its population will live in urban areas, according to UN-Habitat, we expect food demand to come from a population of net food buyers. Food demand will have to be met by rural and peri-urban areas, and may be supplemented by food imports.

Availability. One of the problems facing expanding cities is the ability of local hinterlands to meet new demand patterns, due to land-use changes associated with urbanisation and rising competition for irrigation water. Prime agricultural land may be transformed into residential or industrial areas as urban areas grow – a problem experienced in China in recent years. According to research carried out 12 years ago by Maxwell et al, an estimated 2,600 ha of agricultural land in Accra, Ghana was converted annually. This process can only have accelerated in the intervening years.

Urbanisation is also accompanied by rising demand for water, which could crowd out agricultural demand. In a review of water policies covering two-thirds of Africa's countries, it was found that in the 1970s most urban areas drew water from groundwater sources in, or close to the city. However, as urbanisation pushes up water demand for domestic and industrial use, many countries are increasingly drawing upon ground and surface water further from the city. This is placing pressures on distant ecosystems and lowering water tables, which could result in increasingly dry zones. As most African agriculture is rain-fed, declining water tables are negative for crop yields and production. This, in turn, pushes rural populations towards urban centres, thus exacerbating the pressure on water demand and creating a vicious circle.

Stability. Ensuring food stability as Africa urbanises implies securing consistent access to food. Expanding urban areas suggests that increasing amounts of food need to be transported to and distributed within Africa's cities. This will increase pressure on rural infrastructure, transport networks and food distribution centres. One Nigerian study (Bayo, 2006) estimated that for a city of approximately 4mn residents, food requirements average about 3000 tpd. This is equivalent to approximately two 3-tonne trucks entering the city every three minutes. Thus, ensuring food access to urban dwellers will bring with it logistical challenges with regard to transport and traffic congestion. This applies for both locally produced and imported food.

Safety. Urbanisation has been found to increase diet diversity, which could compromise food safety as food in urban areas is increasingly consumed outside domestic venues. In Tanzania, approximately 70% of the caloric requirements of low

and middle-income households are met by street food, according to the FAO. In a survey (Maxwell et al, 2000) of 559 urban households in Accra, it was found that more than 32% of the households' food budgets were spent on street foods. This share was even higher for poorer households. As most of Africa's street stalls are unregulated, lack sanitation facilities, running water, and adequate refrigeration, there are strong links between the food they produce and the prevalence of gastrointestinal infections. Therefore, there is less food safety in urban areas and particularly for those on low incomes.

Access. According to Matuschke (2009), because most urban dwellers buy most of the food they consume, having sufficient resources to afford a healthy diet becomes the most important dimension of food security in urban areas. According to the Maxwell study, residents in many developing world cities buy more than 90% of their food. Moreover, the poor spend the largest share of their disposable income on food. Urban dwellers are therefore more dependent on cash incomes and employment opportunities than their rural counterparts. Food prices are therefore also very significant in urban areas.

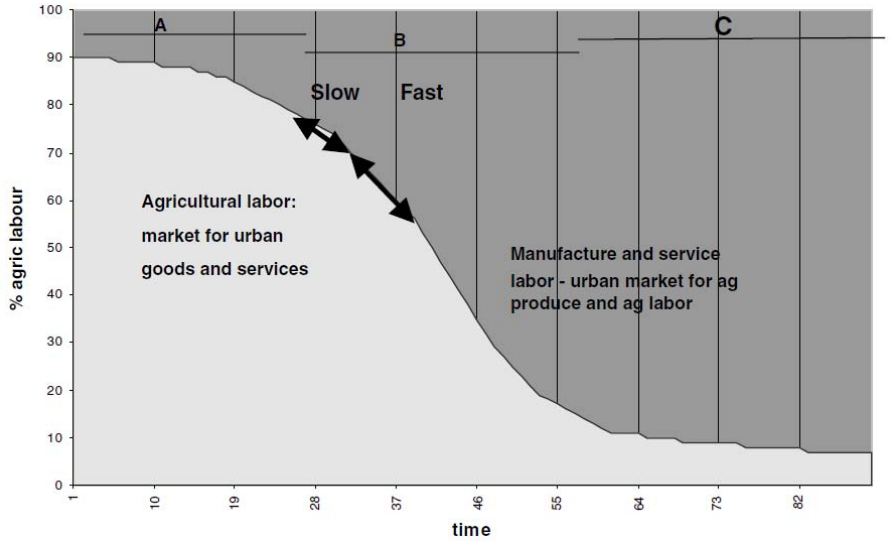
Sub-Saharan Africa's food density levels (calories/km2/day), which combine per capita food demand (daily calorie intake per person) and population densities (people/km2) are generally low compared with Asia, according to the Matuschke study. Food density levels measure food demand in a given area over a certain time period. Today, only the cities in West Africa and a few areas around Lake Victoria, in East Africa, have high food density levels. In 2050, food density is projected to increase around the highly populated coastal areas of West Africa, particularly Nigeria. This growth will be driven by urbanisation. If these urban areas are not able to adapt to changing conditions, the risk of food insecurity will increase in places like Nigeria's megacities. The high population density areas of rural and urban East Africa will also see an increase in food density, particularly in Ethiopia, Burundi, Rwanda, the Democratic Republic of Congo, and Uganda.

How urbanisation shapes agricultural systems

African urbanisation need not necessarily result in higher risks of food insecurity. Research by Tiffen (2003) suggests production systems can adapt to increasing urbanisation. Tiffen argues that the process of urbanisation is often accompanied by an evolution of farming systems, which will sustain food security. This is outlined in Figure 49. Over time, as agricultural labourers move into the manufacturing and services sectors, farming evolves from labour-intensive smallholder practices towards large-scale, capital-intensive and productive farming methods. Meanwhile, the growing purchasing power of urban areas, in turn, provides a ready market for agricultural produce.

Urban areas not only attract labour from rural areas but also their products, including food. There is thus a symbiotic relationship between agricultural (largely rural) and non-agricultural (largely urban) sectors of an economy that evolves over time. In phase A of Figure 49 almost all labour is involved in food production for its own household (subsistence farming), at low levels of output per labourer. If any chart pinpoints the positive outlook for African agriculture it is this one.

Figure 49: Agriculture, manufacture and service sector labour over time



Note: Arrows show positions of low income and lower middle income countries in 1960 and 1980, as given in World Bank (1983)
Source: Tiffen, M. (2003). Transition in Sub-Sahara Africa: Agriculture, Urbanisation and Income Growth. World Development, 31(8), 1343-1366.

In effect, Figure 49 highlights how agricultural labour and non-agricultural labour form each other's market. The rural area supplies agricultural produce and labour to the urban area, which in turn supplies goods and services to its rural counterpart. Moving out of phase A is slow and a significant challenge. Tiffen estimates that Phase A, where most of the workforce is involved in agriculture, typically lasts many centuries. However, phase B, where the agriculture labour force-to-total labour force ratio begins to fall at an increasing rate, can be accomplished in 50-500 years. Today's developing countries are generally making the transition more quickly from phase A to Phase B than Britain did, during its industrialisation period, in the 1700s. Most of Africa is in the early stage of phase B. In the early and slow part of phase B, access to external capital and (export) markets assists the development of the non-agricultural sector and transport facilities.

Africa's swelling urban areas are opening up market opportunities for farmers, and encouraging rural households to provide a surplus above family needs in return for desirable goods and inputs. In countries with large numbers of smallholder farmers, which characterises most of SSA, their additional purchasing power stimulates the consumer goods and services sectors, as well as the production of inputs for agriculture, thus freeing up labour for more intensive farming. As farmers become a local, effective, cash-earning market, this will in turn spur the growth of urban areas.

As the manufacturing and service sector's productivity and income increases, it will pull labour out of agriculture, leading to the faster stages of phase B. At a certain point, even in populations that are still growing, the actual number of people involved in agriculture will begin to drop, including their share in the workforce. At this stage, the need for additional capital to substitute for labour, in all sectors including agriculture, will grow. A tendency towards bigger, capital-intensive farms will develop as phase C approaches.

As most of Africa is still in the early stage of phase B, the overriding policy objective is to improve the productivity the continent's small-scale farming sector. This requires many repeated small private investments including developing new land,

acquisition of new inputs, increasing the value of livestock held, planting and nurturing tree seedlings and so on. The cumulative size of these incremental and intermittent investments depends on whether there is an enabling policy environment. Private investment in agriculture will be most effective if there are appropriate public investments outside agriculture, including communications infrastructure.

African farmers can meet internal demand without increasing productivity only if they transfer resources from export crops (including cocoa, cotton and coffee) to food crops. Most countries on the continent do not export more than 20% of their agricultural production value, implying that 80% is consumed locally. Internal consumption of crops has thus grown alongside urbanisation to such a point that it is more important than exported crops, as we would expect for countries in the transition phase B illustrated in Figure 49.

The increase in Africa's urban population and market over time is especially visible in northern Nigeria. Between 1952 and 1991, Kano state's urban population increased by about 8% pa, while the rural increase was closer to 1.6% pa. This strong urban growth explains why Kano will be one of Africa's 10 most populous cities by 2025. To provide for the urban areas, each rural household needed to supply 10x as much grain to urban markets, on average, in 1991, compared with 1952. Since then the lack of investment in Nigeria (and much of SSA) has meant that local supply has not kept pace with demand and imports have resulted in significant food deficits.

In northern Nigeria, the most efficient farms were concentrated in high-density areas with access to good market facilities, which highlight the importance of public infrastructure. Large-scale farms around Kano increased significantly in the late 1990s but they only make up about 5% of total agricultural production.

Makueni, in Kenya, is an exception to the region's urban growth story. It is telling that until 1998, there was no collective urban investment in electricity, telephones and so on in Kenya's district town of Makueni. Therefore, even on the highway, business activities are limited to services to travellers, marketing crafts and small industries that can still operate competitively without power. The proportion of Kenya's population that lives in urban areas was 22% in 2010, which is significantly low relative to the African average of 40% and moderately lower than the East Africa (as defined by UN-Habitat) average of almost 24%. Farmers from the district of Makueni had some access, albeit on poor roads, to the big cities of Mombasa and Nairobi for their high value crops such as fruit and vegetables, but had no comparative advantage in producing maize for these cities.

So, the issues are clear: an urbanising Africa is positive for agricultural growth. We could be negative and say that rising food deficits indicate the agriculture sector has fallen behind in terms of productivity. However, we believe this simply indicates the scale of the opportunity. Over the long term, a growing population, greater urbanisation, an existing structural food deficit and growing international food needs are four factors which we think – if addressed with appropriate public policy responses and the clever application of private capital – could turn African agriculture into one of the great investment themes of the next few decades.

The inevitability of superfarms

We must do our utmost to develop large farms and to convert them into grain factories for a country organised on a modern scientific basis – Joseph Stalin

Farming looks mighty easy when your plough is a pencil and you are a thousand miles from the cornfield – Dwight D. Eisenhower

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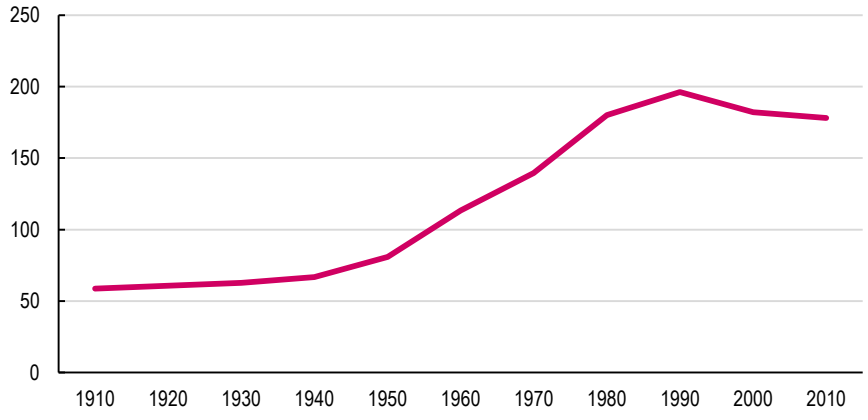
The debate over the optimum size of farms is not a new one. The central argument is the extent to which large-scale farms can achieve economies of scale over their small-scale peers. This debate has, in recent years, become more prominent with the emergence of the so-called superfarm. The objective of this section is to examine the hypothesis that the dominance of these businesses is inevitable. Global food demand is undergoing a major structural shift and this could lead to a concentration of output in those regions that offer the least cost of production on farms that can produce commodity crops at the lowest unit cost. *Are superfarms extracting economies of scale? Is their rise a cause or effect of capital deployment in the sector? Is their rise inevitable in the long run, as supply challenges force efficiency improvements?*

For the purpose of our analysis, we consider a superfarm as a farming company or corporation that actively crops (not just owns or controls) in excess of 100,000 ha. The particular geographies we are interested in, and to which this phenomenon is relevant, are Africa, South America (specifically Argentina and Brazil) and Eastern Europe (specifically Ukraine and Russia).

Farms are getting bigger

Figure 50: Mean US farm size, 1910-2010, acres

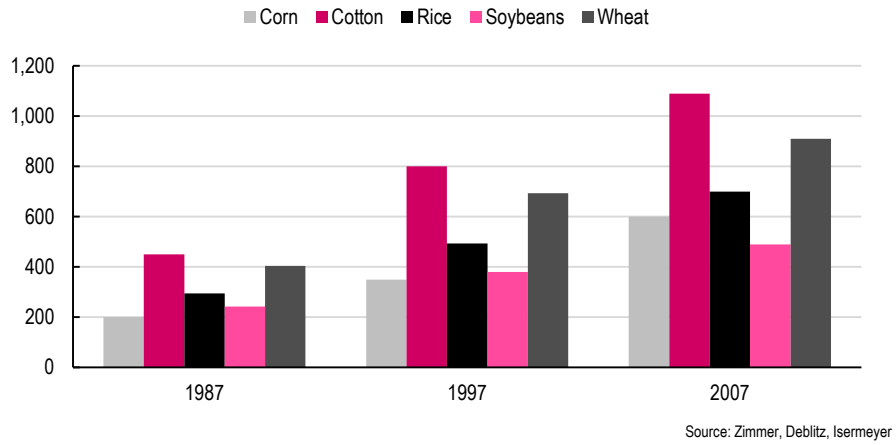


Source: Mac Donald 2011

Agricultural production is shifting to larger farms. In Europe and North America, farm sizes have been increasing, on average, since 1950. In Africa, Asia and Latin America, by contrast, farm sizes declined in the late 20th century (although for reasons more connected with land redistribution). For centuries, family farms have been the most efficient way to organise agricultural production. Farm sizes continue to vary widely, but a significant 60-70% of the world's current agricultural production comes from farms of under 2 ha in size. In fact almost 85% of the world's farms in absolute terms are under 2 ha in size. According to one study by Zimmer, Deblitz

and Isermeyer, however, the median area of wheat grown in the US, for example, more than doubled from 162 ha to 364 ha between 1987 and 2007.

Figure 51: Median harvested area in the US by commodity, acres



Source: Zimmer, Deblitz, Isermeyer

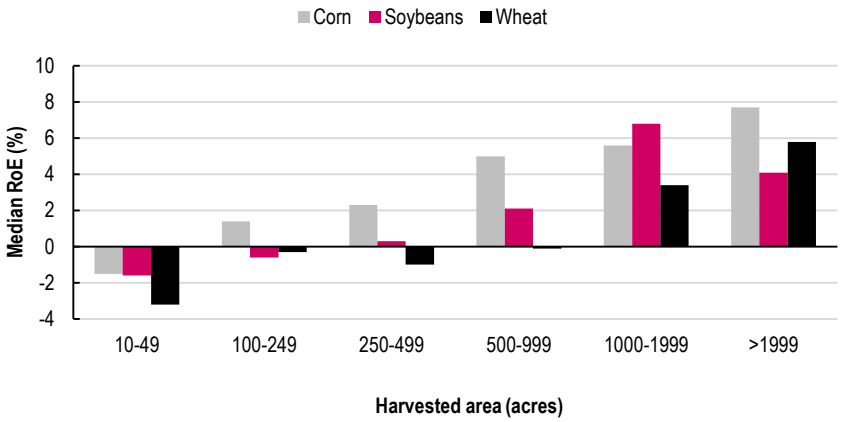
However, we note clear parallels between shifts in the developed and developing world in terms of relative factor costs of production; and this is what leads to larger farms. Looking backwards, we see little evidence of economies of scale (after certain low-level thresholds are reached) in the developed world since the Second World War, and yet farm sizes have increased. According to a recent study (MacDonald 2011) one of the major reasons for this structural shift has been an increase in non-farm earnings plus a relative decline in the cost of capital. In simple terms, labour left the agricultural sector, as it has done consistently and rapidly throughout the industrial age.

Simultaneously, the adoption of new capital equipment meant remaining labour could farm larger areas i.e. productivity improved. In short, capital substituted labour. It is often a cause of some debate as whether the development of labour-saving equipment was a cause or effect of reducing numbers of people working in the sector. Kislev and Petersen (1982) argued that the causal relationship between the relative change in factor costs of production and increase in farm size was further underlined by the fact that in the 1970s, a long-run trend of rising relative labour prices ended, as did a long-run increase in farm size.

Returns on capital and lower costs of production

Figure 52 shows median rates of return on equity (RoE) as measured by total harvested area. The evidence seems unambiguous: larger farms achieve substantially higher returns than medium-sized farms across the two main cereals, and broadly across soybeans. However, do larger farms necessarily mean lower costs of production?

Figure 52: Median RoE for US crop farms by harvested area and commodity



Note: Data 2008-2010 pooled

Source: Mac Donald 2011

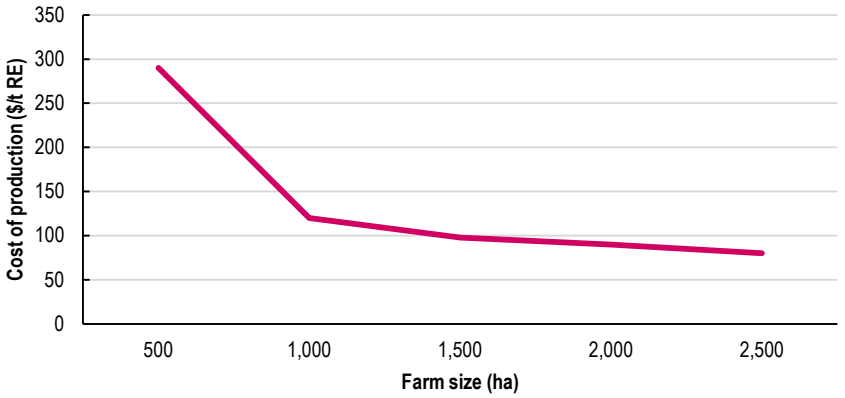
The USDA's ERS operates a commodity cost of production (COP) estimate based on field-level analysis. Overall this does not provide any evidence for lower costs of production – at a field level – for enterprises operating on more than, say, 20 ha. However, field-level cost estimates have to use estimates based on equipment service hours and labour hours used. In other words they use divisible equipment and labour costs. This ignores the reality that a 20 ha farmer may be utilising 20% of his equipment capacity and a 5,000 ha farmer may be utilising 100% (or vice versa) of his equipment capacity. The larger farmer may therefore be operating at significantly lower equipment cost per hectare compared with the smaller farmer but this or any other effect is not allowed for in the ERS analysis.

So, how do we explain no evidence for a lower field-level cost of production on larger farms and simultaneously higher overall returns on capital? The reality is that there are field-scale operational efficiencies that typically come in the form of labour and machinery savings. A 550 hp tractor with an 18-metre drill seeding 300 ha/day has a much lower overall operational cost per hectare than an 80 hp tractor with a 3 metre drill seeding 25 ha/day. Both require one operator and a second person loading the drill. However, we remain cautious in looking at these large datasets, as they can distort reality. At this stage, however, we assume a 550 hp tractor and 18-metre drill require a great deal more capital than their small-scale equivalent. This is an issue to which we will return.

Other important factors that influence field-level costs are the ability to use GM crops and minimum tillage or no-till conservation practices. These can have a marked impact on field-level costs. The ability to use herbicide-tolerant seeds means that an operator can apply one post-emergent herbicide rather than, say, three – thereby reducing overall operating costs. Of greater importance is no-till farming where the ability to seed directly into previous crop residues without cultivation or soil inversion significantly reduces overall operating costs. This comes in the form of lower overall machinery and equipment requirements (thus, lower capital employed per hectare) plus lower overall operating costs per hectare and per tonne produced.

Zimmer et al framed this through an analysis of IFCN (International Farm Comparison Network) data and demonstrated a clear relationship between farm size and overall cost of production.

Figure 53: Farm size vs cost of production



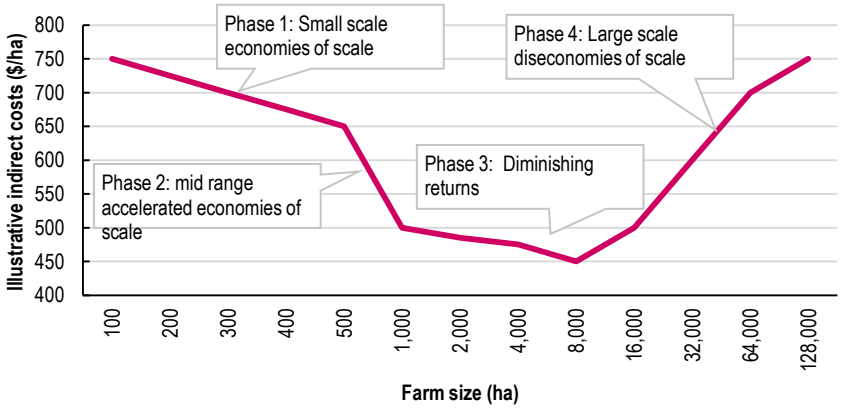
Note: t RE – tonnes of rapeseed equivalent

Source: Zimmer, Deblitz, Isermeyer

We note, however, that diminishing returns begin to set in at a relatively early farm size of approximately 1,000 ha.

The second part relates to indirect costs, which often form the largest variable between businesses of similar sizes and also between businesses of different sizes. Indirect costs are all those elements that are not directly related to area or production-based costs. They include property costs, machinery repairs and spares, energy costs, office and administration, rental costs, insurance, finance and depreciation. These are often the most difficult costs to establish and can be widely variable. Observations across a wide range of farms across different continents indicate there are economies of scale relating to indirect costs up to a point, but that on these economies of scale can also turn into diseconomies of scale.

Figure 54: Illustrative indirect costs vs farm size



Source: Brown & Co

Phase 1 is a well documented stage of farm development that typically allows family members to farm more land with the same overall level of indirect costs. Phase 2 then indicates a mid-range acceleration of these economies of scale as largely the same resources can manage 1,000 ha not only 500 ha. Phase 3 represents (based on the evidence to date) the optimum farm size as far as indirect costs are

concerned when there is a range of diminishing marginal returns. Finally, phase 4 is the point at which diseconomies of scale begin to take effect. This is where decision-making processes become divorced from reality on the ground, layers of management (farm level, regional, head office) tend to add cost rather than value and burgeoning "departments" replace what the "farm manager" has generally carried out on his or her own: for example, engineering, human resources, legal, finance, marketing, purchasing and so on.

What conclusions do we draw relating to optimum-farm size and the overall efficiency levels of superfarms? Before we address that, we note that most superfarms are in their infancy and relatively undeveloped when it comes to management structures and operating systems. Superfarms, outside Latin America's haciendas and latifundios, are relatively new phenomena and do not have a lengthy history. Excluding the wholesale failure of the Communist experience, there is no institutional or collective or even corporate experience of how to manage and integrate 100,000 ha-plus. These farms are of course not 100,000 ha of contiguous land but many individual units made up of 1-10,000 ha individual farms with a holding company structure trying to ensure consistency of approach and technical competence. How are they different to large co-operatives one might ask? Senior managers often have to deal with disparate land holdings that are the result of previous managements rushing out to acquire land during the years 2006-2008. Little focus (if any) was placed on operational efficiencies at the point of acquisition as the focus was on the swift acquisition of land during a period of high commodity prices. In summary, and in common with many other industrial sectors, a short-term mentality set in.

So, how does the evidence for operating efficiencies and economies of scale at superfarms look? Mixed, is the short answer. At field level there are often economies of scale derived from machinery and labour savings. Typically, however, and at the present time, the evidence is of diseconomies (and specifically managerial diseconomies) of scale relating to what happens before and after the field gate. The indirect costs shown in Figure 54 illustrate what can happen when superfarms do not control indirect costs and become swamped with burgeoning bureaucracies that inhibit effective decision-making. The critical question, however, is: can field-scale economies outweigh managerial diseconomies of scale? Current evidence says no, but we think this may be about to change.

Future efficiencies

Much is made of the detrimental impact of the *human effect* at the ground level. At best, this is often seen as adding an inconsistency into the management process. At worst, it is viewed as solidly detrimental to the management process. If the human effect is so negative, does this explain the prevalence of the family-farming model? Alternatively, given the human element involved, why is the family-farming model so prevalent? Consider the following characteristics of the family-farming model and how they might be contribute to its prevalence. First, family farms can provide an attention to detail afforded by family members who can cultivate, drill, monitor, spray, fertilise, harvest and then store the crop. This means that individuals know every detail of every field and can adjust inputs and timings accordingly, often in subtle ways.

Second, success is very often tied to the efficacy and timing of specific tasks. Optimal timing of input applications is critical. These can change subtly with the weather and workloads vary significantly throughout the year. These variables, many of which are weather dependent and often cannot be controlled, therefore mean that agriculture does not lend itself easily to standard operating procedures. A recent study by MacDonald seemed to confirm that the family-based owner-operator enterprise produces a more efficient reward and incentive system than large-scale enterprises. This may or may not be true but until now the incentive systems implemented on large-scale enterprises have been ineffective, weak and have certainly not rewarded individuals that can make a real difference to the timeliness and quality of operations.

There is some evidence that this may be changing. In some cases this means systems are actually being introduced (i.e. from scratch) and in other cases systems are being changed so they become relevant and have the intended effect of incentivising management and staff to make and take the right decisions. This could make a material difference if incentives can be re-aligned.

However, it is likely to be a step change in the use of technology that will drive the efficiencies of large-scale enterprises. Indeed it is possible that scale-related technological innovations could, in principal, be so large that the management advantages held by family farms is swiftly rendered redundant.

Areas and innovations, which can standardise operating procedures, and remove the “human effect” have the potential to reverse these managerial diseconomies of scale. Clearly, family farms will also have similar access to management innovations but it is more likely that, in the medium term, larger-scale enterprises will receive a greater return on these investments for the simple reason that they will have the necessary access to capital in order to be able to pay for them.

- **Satellite-based imaging.** Take for example, the use of satellite-based imaging coupled with soil analysis. These practices, in their earliest stages of development, provide good examples of how in the future many management decisions, such as nitrogen fertiliser application, may be handled remotely. Historically this has been an “eyes and ears” decision taken by the farmer on the ground but it could be the case that the scientific application of technology may improve the effectiveness and efficiency of large-scale agricultural enterprises.

- **Precision-based farming technologies.** These aim to identify in-field variability and its causes, and prescribe site-specific input applications that match varying crop and soil needs and apply the inputs as required. Reduction of input levels, increased efficiency of those inputs and improved timing of the inputs are the overall goals. The benefits are reduced overall costs, greater accuracy of input applications and efficacy and therefore increased productivity. The technology is moving rapidly and in many ways it is likely to evolve further and become particularly effective on large-scale enterprises where detailed knowledge of individual fields/crops needs to be mapped. A simple example: nutrient maps reveal the variability of nutrients across an individual field. Precision-methods allow data to be gathered and interpreted. Then the tractor moves across the field using software connected to GPS and it automatically varies the rate of fertiliser application according to the data gathered. The potential here is that

technology replaces – or at least augments – the eyes and ears of the farmer. On a 100,000 ha enterprise this is invaluable as it improves management effectiveness dramatically, goes some way to the removal of human variability and ensures the management process is internalised (i.e. open to review and adjustment almost in real time).

- **No-till farming.** When this technology is coupled up with no-till farming, major efficiency improvements begin to gain traction. Lower fuel requirements, lower machinery costs, more efficient and accurate input applications, lower overall machinery and equipment requirements all combine to mean lower capital requirements as well. However, and this is where we return to the issue of capital requirements, there is still a huge capital requirement involved in the establishment and implementation of such large-scale enterprises. The major reason for this is that in countries where this type of technology is either developed, or developing, infrastructure improvements are paramount. On farm storage, bringing land in to production, improving (or simply building on-farm) infrastructure, acquiring machinery and equipment, improving soil pH levels, funding crop inputs and working capital, all take considerable amounts of capital.

One of the fundamental constraints on farm size (and the family farming model) historically has been access to capital. In the 20th century one of the significant drivers of the increase in farm size was the relative shift in the cost of capital versus labour.

If the agricultural sector can corporatise successfully, and technology can be harnessed to reverse some of the diseconomies of scale observed recently, is it reasonable to assume capital will be allocated to large-scale enterprises? We think so. Food production is much more than the efficient operation of large-scale enterprises: a wealth of other factors – not least government action – ultimately set the framework by which food production can succeed or otherwise.

We noted in the last bullet point, on no-till farming and its possibilities, that infrastructure improvements were a necessary and vital component in the application of these technologies. Clearly, this has significant ramifications for Africa. It would be easy enough to revert to type and dismiss the clichéd version of Africa (that it is poor; its agriculture sector is not just undercapitalised, it is subsistent; and that smallholders will always dominate).

We believe the other fundamental pressures on the need to supply the burgeoning needs of Africa's cities, coupled with demands among certain key international emerging markets, mean African agriculture could leapfrog its international peers, simply because it does not have to contend with legacy systems and structures.

This is not a new theme. The wreckage of German and Japanese industry after the Second World War, the development of wireless networks in Asia, where analogue networks had barely existed before millions of subscribers were being added to newly established digital networks and greenfield automobile plants all demonstrate the effectiveness of developing business without the hindrance of legacies.

Could Africa replicate the experience in Brazil, where an agricultural backwater turned itself into an agricultural superpower over four decades, due to a lack of legacy structures? We note the ability of large-scale enterprises to aggregate large

amounts of land and capital with relative ease compared with Europe and the US. If this promise of economies of scale turns out to be a reality, Africa is poised to be a major beneficiary and leader in the field of large-scale farming.

The sustainability challenge

Sustainability means running the global environment – Earth Inc. – like a corporation: with depreciation, amortisation and maintenance accounts. In other words, keeping the asset whole, rather than undermining your natural capital – Maurice Strong

We have to find a way of dealing with this that engenders confidence, trust, gives us every chance of getting the right outcome and boosts both sustainability and economic return at the same time – John Anderson

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The focus in African agriculture has largely been on the need to develop technologies that can deliver food at lower cost for a rapidly growing (and urbanising) population. Per capita, agricultural food production in Africa remains lower than in any other continent, and food security is still a major challenge. Inadequate use of external farm inputs, a lack of irrigation infrastructure and other technological resources have long been major causes of Africa's weak position in agriculture. Much attention, over many decades, has been given to programmes aimed at increasing African farmers' access to these assets. Little attention, however, has been given to the ecological risks that equally have the potential to retard agricultural production and undermine human welfare across the continent. Environmental problems such as land degradation, water pollution, climate change and loss of biodiversity are now recognised as some of the most serious threats to human welfare.

Agriculture, which accounts for more than 12% of the earth's land surface, is not only seen as one of the major sources of these environmental problems, but is also a sector that is highly vulnerable to these risks. Agricultural output is associated with water pollution from excessive use of agricultural chemicals (fertilisers, pesticides, herbicides and so on), loss of biodiversity and soils degradation resulting from inappropriate farming techniques. At the same time, agriculture faces an uncertain future in the face of global environmental challenges such as climate change.

In recognition of these ecological challenges, an increasing emphasis is being placed on sustainability in agriculture. Sustainability draws attention to the need for agriculture to meet current and future food demands without causing irreparable damage to the resource base – an important goal for African agriculture. In addition, we will examine the ascendancy of new sustainable strategies in Africa with the potential to mitigate the adverse ecological effects of agriculture and to provide a buffer against future ecological threats such as climate change. Increasingly, it is argued that these strategies herald a new era as demand for sustainably produced agricultural output continues to rise.

The chapter consists of four main sections. In the first, we draw attention to two of the most pressing ecological challenges: land degradation and climate change. In the second, we examine the notion of sustainability as a means of addressing these ecological challenges. The third section examines organic agriculture and conservation agriculture as two sustainable strategies gaining ground across Africa. We argue here that these strategies have the potential to herald a new era for African agriculture. Of course, there are pessimists who believe that we are at ecological limits and nothing can save us from an impending environmental crisis. By drawing attention to these strategies, we demonstrate that African agriculture can achieve growth with minimal environmental impact as well as provide a buffer against future ecological threats. We close our analysis of sustainability issues by

examining the notion of payments for ecosystem services and eco-labelling as tools that present an opportunity for advancing sustainability in African agriculture.

Land degradation and climate change

While there are many environmental challenges associated with African agriculture, there is agreement that land degradation and climate change are among the most pressing concerns. In this section, we show the extent of these problems in Africa and their implications for African agriculture growth before discussing sustainable agricultural strategies with potential to address these challenges.

Land degradation

In simple terms, land degradation refers to the reduction in the biological productivity of land. According to the USDA, global land productivity has declined by 50% with only 11% of the global land surface now considered as prime farmland. Although most of the statistics on the extent of African land degradation are unreliable, the FAO reckons that African yields are 2-40% lower than they should be due to degradation. Figure 55 highlights estimates of African land degradation and how it compares with other regions.

Figure 55: Estimates of land degradation in Africa and other regions, mn ha

Region	Total land	Degraded land	Percentage degraded
Africa	187	121	65%
Asia	536	206	38%
South America	142	64	45%
Central America	38	28	74%
North America	236	63	26%
Europe	287	72	25%
Oceania	49	8	16%

Source: AU/NEPAD, 2006

Figure 55 demonstrates that 65% of Africa's land surface is degraded. Land degradation has the potential not only to disrupt food production and exacerbate poverty but also to increase the continent's vulnerability to droughts and other ecological hazards. According to the FAO, African countries have lost significant quantities of their soils to various forms of land degradation. Some areas of Africa are said to be losing over 50 tpa of soil per hectare. This is roughly equivalent to a loss of about 50bn tpa of nitrogen, 2bn tpa of phosphorus and 41bn tpa of potassium.

Soil degradation is a major problem in Somalia, Sudan, Niger, Mauritania, Ghana, Nigeria, Ethiopia, Senegal, Rwanda, Liberia, the DRC and the Central African Republic. Deforestation and agricultural methods that undermine the resource base are the main culprits. Agricultural methods that remove trees from farmland and arable expansion into forested areas all exacerbate degradation. In addition, land degradation has been worsened by the fact that land preparation in Africa is often carried out by tractors or ox-drawn ploughs. From an environmental point of view, this has an adverse effect on soil structure, water holding capacity and soil fertility. The Golden Valley Agricultural Research Trust (GART) in Zambia, for example, notes that successful ploughing at a constant soil depth can lead to the formation of hard pans that prevent crop root penetration and water infiltration.

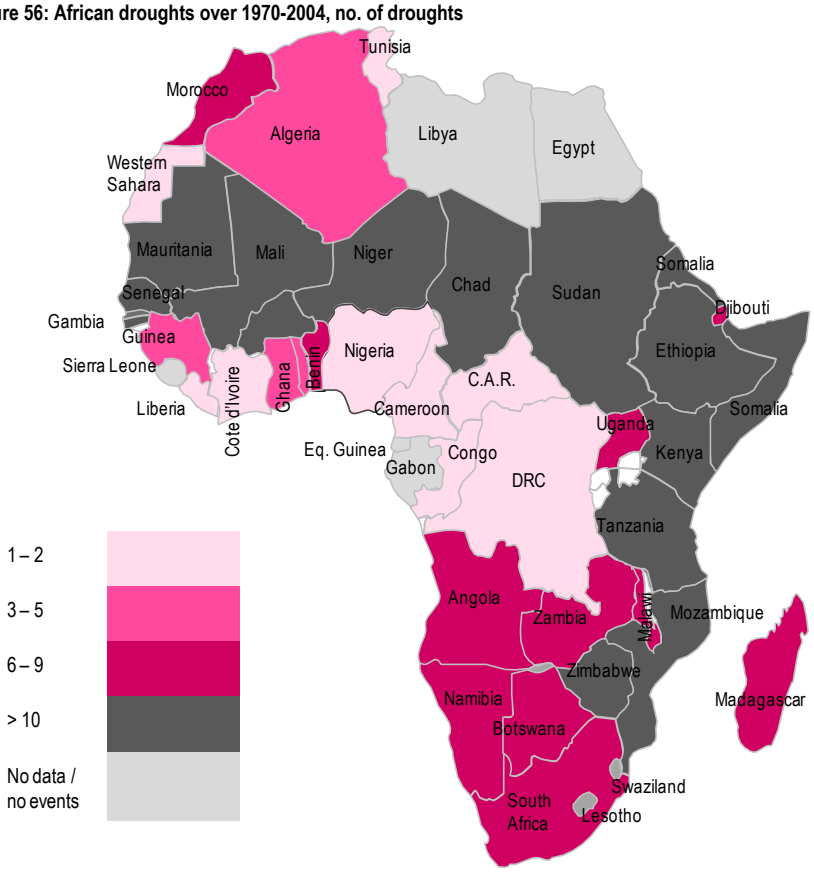
Land degradation in Africa will likely increase in tandem the continent's human population. However, while human population pressure is important when looking at land degradation, it is now commonly agreed that high population growth is not necessarily the cause of land degradation, rather it is what humans do to the land that is the main cause. In other words, it is unsustainable land management practices that are detrimental to the resource base and not population per se. It follows that if unsustainable human action has been responsible for extensive land degradation, human action can also do much to maintain land quality or reverse degradation. This underscores the importance of sustainable agricultural strategies with the potential to maintain the biological productivity of the land and to trigger the rehabilitation of degraded lands. It is argued that millions of hectares of land can be restored through sustainable agricultural strategies thus allowing agriculture to grow without expanding into forests and other sensitive ecosystems. The reclamation of degraded land may allow more land to be available for agriculture and counter the notion that we are rapidly running out of cropland.

Climate change

Although scepticism abounds, it is now broadly agreed that the earth has warmed over the past century. Climate change is already contributing to warmer and drier conditions, which affect the development and growth of plants and other biological organisms across the world. So far, the IPCC notes that decadal warming rates of 0.29 degrees Celsius in the African tropical forests and 0.1 to 0.3 degrees Celsius in South Africa have been observed. In addition, between 1961 and 2000, there was an increase in the number of warm spells over Southern and Western Africa and a decrease in the number of extremely cold days. In terms of precipitation, climate change will possibly trigger a decrease in rainfall across some parts of Africa and, at the same time, lead to an increase in heavy rainfall events in other parts. For example, a decrease of rainfall of between 2-4% in rainfall in some parts of West and central Africa has been observed. In addition, climate change may induce salinity conditions, increase heat stress and influence hydrological water balances with significant implications for the amount of water available for crop production and livestock.

Although Africa has contributed little to GHG emissions, due to its lower economic output and industrial activity, the Stockholm Environmental Institute notes that African countries are disproportionately vulnerable to the impact of climate change. The difficulties that Africa could face under climate change are perhaps being played out in one of the worst droughts in 60 years and which struck much of East Africa this year. Under a climate change scenario, the IPCC warns that drought episodes are likely to become more frequent and increase in geographic extent. Currently, more than one-third of Africa's population lives in drought-prone areas. Figure 56 shows the frequency of droughts in African countries between 1970 and 2004. In at least 15 African nations, more than 10 drought episodes were experienced between these years.

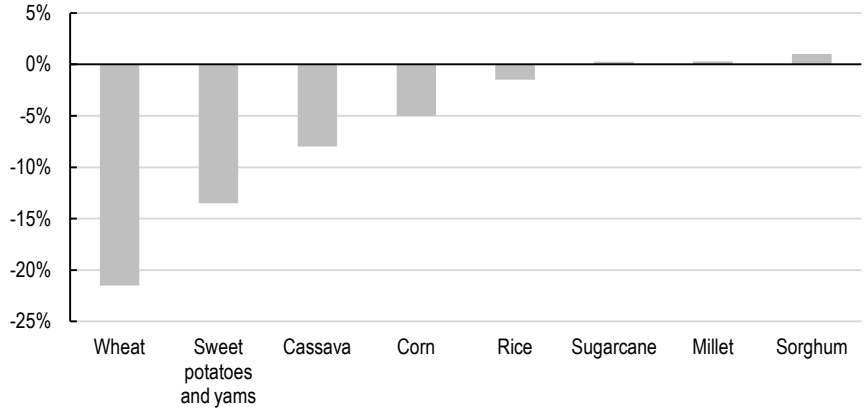
Figure 56: African droughts over 1970-2004, no. of droughts



Source: UNECA, 2011

An increase in droughts and other climate-related problems could slow African agriculture growth significantly. The IPCC notes that areas in the Sahara are likely to experience agricultural losses of between 2-7% of GDP while Northern and Southern Africa losses may range between 0.4-1.3%. On the other hand, Western and Central African areas might experience losses of between 2-4% of GDP. According to the IFPRI, cereal production for a range of crops in Africa is expected to decline by over 3% by 2050 with wheat and sweet potatoes expected to be the worst affected. That said, yields of crops such as millet and sorghum, known to be stress-tolerant, are expected to increase with climate change. Therefore, although many crops could see a decline in production under certain climate change scenarios, some crops should deliver higher yields.

Figure 57: Projected changes in crop yields due to climate change (2050)



Source: International Food Policy Research Institute 2010

The vulnerability of agriculture to droughts is exacerbated by the fact that African agriculture is largely rainfall-dependent – less than 5% of Africa's agricultural lands are irrigated. The Swedish Environmental Institute notes that despite the fact that over 60% of Africa's population is dependent on agriculture, only 1% or less of Africa's national budgets is allocated to the sector. This poor funding partially explains the region's failure to invest in expensive irrigation infrastructure development. An important policy concern today is to prevent further climate change and mitigating its impact on various social and economic sectors, including agriculture. This requires focusing attention on agricultural strategies that contribute to the reduction of greenhouse gases emissions and allow adaptation to any changes. In short, it requires giving more attention to sustainability issues.

What does sustainability in agriculture mean?

The challenges outlined in the preceding section provide an indication of the extent of Africa's environmental problems, and show the need to take seriously the notion of sustainability in agriculture. The African agriculture sector needs to respond urgently to current environmental challenges and provide a buffer against future threats such as climate change. This is what we may term *the sustainability challenge*. Although sustainability is often subject to different interpretations by different commentators, it simply means current and future demands for agricultural products must be met in an economically and socially viable manner, without compromising the resource base on which agriculture depends.

In other words, sustainability in agriculture holds that it is possible to increase agricultural production while conserving the environment. As a term, *sustainability* has its roots in ecology and is used to describe the ability of ecosystems such as forests, wetlands and aquatic systems to maintain ecological processes and productivity into the future. It means that resources must be utilised at a rate at which they can be naturally replenished. It also means that this generation has the responsibility to leave better opportunities for future generations – something that is not possible if the resource base is severely depleted.

Put simply, for agriculture to be sustainable, it must address three issues:

First, it must address the negative environmental and social effects of farming, such as pollution of aquatic and terrestrial systems due to use of fertilisers, pesticides and other agrichemicals; and soil compaction due to ploughing of agricultural lands. We acknowledge that use of external inputs has played an important role in the advancement of agriculture, and in ensuring production keeps pace with population growth. Moreover, others have argued that this technological, capital-intensive agricultural model is still the best answer to the issue of African food security. While we agree that there is still a place for external inputs in African agriculture, and indeed, vast numbers of African farmers still require access to these assets, research also shows that extensive use of these inputs is ecologically unsustainable in the long run. Moreover, in the face of global environmental changes, strategies that build Africa's adaptive capacity to ecological risks are crucial to the long-term viability of African agriculture. Consequently, embracing the notion of sustainability implies making important adjustments to the conventional technologically capital-intensive agricultural model in order to relate agriculture to the ecological realities the planet faces.

Second, sustainability implies that agriculture should provide a cushion against present and future ecological threats such as climate change. In other words, it implies building resilient farming systems in order to respond to ecological threats. Resilience – the antithesis of vulnerability – refers to the ability of a system to withstand shocks and stresses associated with environmental change such as droughts, floods and pest attacks. The thinking here is that agriculture must reduce its impact on the environment, while at the same time protect itself against future risks if it is to be sustainable.

Third, in addition to addressing the impact of agriculture and building resilience, sustainability in agriculture also implies going beyond mere crop production and venturing into complex areas such as habitat protection, biodiversity conservation, carbon sequestration and water purification. These elements are known as environmental (or ecosystem) services, which agricultural landscapes can produce for the benefit of society besides food and fibres. The term applied to agriculture, that produces such a combination of outputs is *multifunctional agriculture*. Sustainability recognises the multifunctional nature of agricultural landscapes rather than the narrow view of agricultural landscapes as spaces for crop production. In this way, agriculture can contribute towards the creation of a sustainable future for humanity by not only being a producer of food and fibres, but by also protecting and enhancing important environmental services required for regulating life support systems. For example, agriculture, which uses more than 12% of the world's landscape, may be key to increasing the world's terrestrial vegetation cover by integrating agro-forestry systems in farming landscapes. According to the IPCC, an increase in vegetation density may result in a year round cooling of 0.8 degrees Celsius in the tropics, including the tropical areas of Africa. In this regard, sustainable agriculture may be key to arresting an increase in greenhouse gases and improving the conservation of biodiversity.

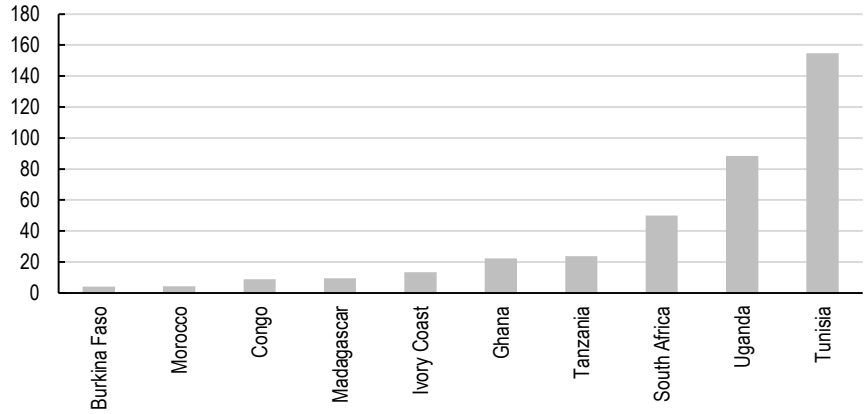
Emerging sustainable agricultural strategies in Africa

This sustainability challenge for African agriculture calls for innovative thinking that allows the development of new agriculture strategies that incorporate this notion of sustainability. Governments, international NGOs and businesses across the world, have engaged in efforts to promote sustainable agricultural strategies. In OECD countries, for example, more than 400 policy measures have been adopted and implemented to make farming sustainable. Similarly, in Africa, two important sustainable agricultural strategies are gaining ground among both smallholder farmers and large-scale farmers. These are organic agriculture and conservation agriculture. Although the two are still in their infancy, they are redefining agricultural practice in Africa and may be important practices in the future.

Organic agriculture

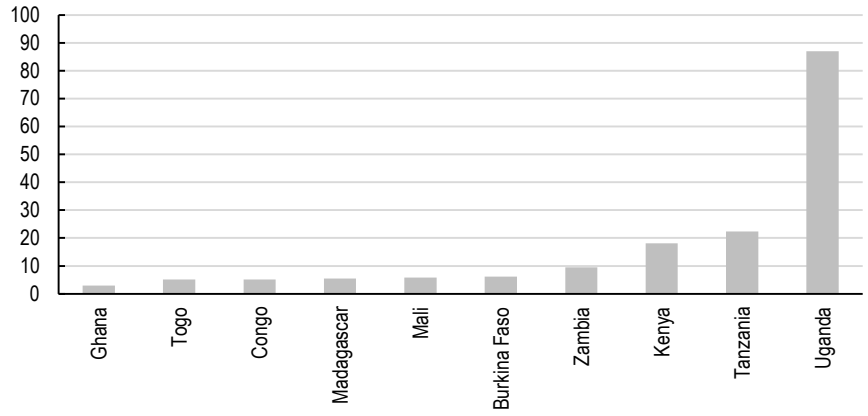
It is estimated by the EU that worldwide, nearly 40mn ha of land is under organic agriculture. In addition, worldwide demand for organic agricultural products, boosted by consumer concerns over the environmental effects of agriculture is increasing steadily. In Africa, there are already over 150,000 certified organic farmers. In addition, the International Federation on Organic Agriculture Movements (IFOAM) notes that there are many more organic farmers in the informal sector who are not captured in these statistics. The main crops that are organically grown include olives, oil palm, cotton, cocoa and coffee. Figures 58-59 present statistics on the top-performing African countries in organic agriculture.

Figure 58: The 10 countries with the most organic agricultural land



Source: IFOAM, 2008

Figure 59: The 10 countries with highest number of organic farms in Africa



Source: IFOAM, 2008

Organic agriculture seeks to restrict, or eliminate entirely, the use of chemical fertilisers, pesticides, growth regulators (such as hormones, livestock antibiotics, food additives and GMOs) as well as other external inputs. Instead, organic agriculture places emphasis on crop rotation, use of green manure (cover crops) and biological means of controlling pests and organic manure. The use of legumes, which can be intercropped with cereals, rotated or used in improved fallow systems, is an important component of organic agriculture. Research has shown that leguminous plants can biologically supply important nutrients such as nitrogen while also providing food for human beings and livestock. Figure 60 illustrates the capacity of certain legumes to improve soil fertility.

Figure 60: Estimated nitrogen fixation in the soil by food legumes

Legume species	Nitrogen fixed, kg/ha/year
Sesbania rostrata	400
Jackbean (Canavalia ensiformis)	240
Velvet beans (Mucuna pruriens)	339
Cowpea (Vigna unguiculata)	198
Sunhemp (Crotalaria spp)	169
Guar (Cynamopsis tetragonoloba)	130
Green gram (Vigna radiate)	64

Source: GART 2007 yearbook

By improving the productivity of land through biological means such as the use of legumes, organic agriculture provides an opportunity to arrest land degradation without use of synthetic fertilisers. Other benefits of organic agriculture, according to the FAO (2008), include increased water retention in soils, improvement in the water table (with more water available for drinking and production during the dry season), reduced soil erosion and improved soil organic matter. Organic agriculture also leads to better carbon sequestration and increased on-farm biodiversity than conventional agriculture. In addition, it is argued that organic agriculture can improve the livelihoods of small-scale farmers who practice agriculture on marginal lands.

However, despite the increased demand for organic products and these environmental benefits, there are still some important concerns that that yields in organically managed agriculture where external inputs are excluded are still much lower than conventional agriculture. This has often raised the question of organic agriculture's capacity to meet the ever-rising food needs in Africa and other parts of

the world. However, research also shows that organic farms can withstand shocks and stresses associated with a changing climate better than conventional agriculture. Consequently, during drought periods, the yields from organic agriculture are said to be significantly higher than in conventional agriculture. Similarly, in much drier areas, organic agriculture performs much better than conventional agriculture. In this regard, despite the controversies surrounding the yields from organic agriculture, we have no doubt that organic agriculture has greater potential in fostering the resilience of farming systems to shocks and stresses under a changing scenario than conventional agriculture.

Conservation agriculture

Another important sustainable agricultural strategy that is gaining ground in Africa is conservation agriculture. In Zambia, both commercial and small-scale farmers practice conservation agriculture. It is estimated that over 160,000 farmers representing 10% of the country's small-scale farmers are now practising conservation agriculture. In Zimbabwe, there are 50,000 farmers under conservation agriculture. Conservation agriculture has its origins in the Americas where it has been used as a strategy for mitigating risks associated with dry climatic conditions. In regions, like Brazil's Cerrado for example, conservation agriculture has a 30-year history; in Africa; it is still in its infancy with Zambia and Zimbabwe seen as pioneers. Over the past 10 years, considerable efforts have been made in Zambia to adapt the model to an African context.

Like organic agriculture, conservation agriculture is a low-impact strategy. However, conservation agriculture does not entirely reject the use of fertilisers, herbicides and pesticides. Instead, it emphasises a combination of sustainable agricultural practices that include efficient or reduced use of external inputs. Conservation has three main principles: minimum soil disturbance through zero or minimum tillage, permanent soil cover and crop rotation. In other words, conservation agriculture seeks to combine minimum tillage with use of crop rotation, retention of crop residues, use of cover crops, agro-forestry systems and the efficient use of external inputs. This means that it can combine both organic and non-organic elements of agriculture. In fact, it can combine different farming configurations as long as the three principles above are retained.

Minimum tillage in conservation agriculture is achieved through use of ripping technology (tractor- or ox-drawn) or, for poorer farmers, through the creation of permanent planting basins with hand hoes. It is argued that conservation tillage reduces soil disturbance to a minimum of 10-12%. In addition, minimum tillage allows farmers to reduce energy consumption, retain moisture and decrease the depletion of carbon stored as partially degraded organic matter in the soil. By using minimum tillage, underlying soil pans, which have also been ploughed successfully, can also be broken thereby allowing for adequate root penetration (GART). In addition, by combining minimum tillage with the use of lime, improving fallow systems and the application of animal manure, conservation tillage can trigger an important process of restoring degraded lands in Africa. It is important to note here that minimum tillage is a strict requirement for conservation agricultural producers. In contrast, organic farmers are not mandated to adopt minimum tillage. However, some organic farmers adopt minimum tillage because of its wider benefits. According to the World Agroforestry Centre, currently about 100mn ha of land worldwide are under minimum tillage. Although the trend in Africa is rising, only 500,000 ha is currently under minimum tillage.

Permanent soil cover in conservation agriculture is achieved through the retention of crop residues and the use of cover crops. This works to prevent soil erosion, improve soil organic matter and moisture. Conservation agriculture may also include agro-forestry systems in which wood perennials are deliberately integrated on cropland. Often, Farmers are encouraged to integrate wood perennials with the capacity to improve the productive capacity of land (e.g. through nitrogen fixation and increase in organic litter). For example, in Zambia, *Faidherbia Albida* has become the preferred tree species used in conservation agriculture. As a multi-purpose tree, research has shown that the tree has potential to reduce the amount of fertiliser used on farm plots. According to the GART research unit in Zambia, the leaves of the *Faidherbia Albida* can contain 3.6% of nitrogen. A six-year-old tree is capable of shedding 500 kg of leaf dry matter – the equivalent of applying 18 kg of fertiliser per ha. Research in Malawi Rhoades also shows that maize yields under *Faidherbia Albida*, can reach up to 3 t/ha compared with 0.5 t/ha away from the canopy. Apart from improving soil fertility, wood perennials also help in preventing soil erosion, enhancing biodiversity, carbon sequestration and improving the resilience of agriculture to climactic shocks and stresses, such as droughts and floods.

These are important ecosystem services, and increasingly they are in demand. In addition to the ecological benefits derived from agro-forestry systems, the integration of woody material on farm plots can provide additional livelihood benefits for small-scale farmers. For example, farmers can obtain fuel wood, construction materials and other products from trees on the farm plots. In this regard, the choice of trees used in conservation agriculture systems is crucial.

While there is still debate regarding the profitability of organic agriculture, research has so far shown that yields in conservation agriculture are much higher than in conventional agriculture. Conservation agriculture has the potential to increase cereal yields by over 100% without requiring an increase in cultivated land. Since Africa needs sustainable agricultural strategies that not only address ecological risks but also result in higher output, perhaps this approach provides an innovative and appealing agricultural strategy to both small and large-scale producers. Conservation agriculture offers African farmers the opportunity to undertake profitable agriculture, while building resilience against current and future ecological risks. As the Zambia Conservation Farming Unit puts it, it allows farmers to regenerate, rather than exploit the resource base.

In Zambia, much effort has been placed in the development of high-yielding and early-maturing crop varieties. An important concern here, however, is that in the quest to promote hybrid crop varieties, indigenous crop varieties that small-scale farmers are already using may be rejected. Some of the local varieties are oriented towards reducing ecological risks and reflect local farmers' knowledge of their agro-ecosystems. Sustainability in this regard, may entail incorporating the knowledge and practices of these farmers, an important element often ignored in conventional agriculture.

While a range of sustainable agricultural techniques is becoming more widely available to farmers, one of the major challenges for sustainable agriculture in Africa is the mechanism of how to promote sustainability to levels that have a significant influence on food security and the environment. Clearly, policy responses are required at both national and international levels in terms of the development of supportive policies and markets for sustainable output. One of the most important

questions is how to motivate farmers to adopt sustainability measures that are beneficial to the environment and society considering that some of the measures imply additional costs to farmers. Equally important is how to persuade businesses and consumers to buy into these strategies in order to create a sustainable future.

A range of measures is now used worldwide to bring various actors into the sustainability agenda. These include the use of mandatory regulations and advisory measures. Mandatory regulations imply that governments develop legislation that compels agricultural producers and businesses to adopt sustainability measures. While these "command-and-control" instruments have a place on the sustainability agenda, increased attention is turning to the use of flexible economic instruments. In particular, discussions on innovative measures to promote sustainability are focusing on payments for ecosystem services from agriculture and the use of premium pricing through eco-labelling. In the next section, we discuss how these instruments work.

Direct payments for environmental measures

One of the mechanisms to have emerged to advance sustainable agriculture is the use of direct financial rewards for farmers who incorporate environmental sustainability measures into their farming systems. As already noted, sustainability means that farmers should not only be considered as producers of food and fibres, but also as providers of environmental services that benefit wider society. However, note that while food and fibres have been produced traditionally for sale or consumption, such that they are highly visible to the market, the same cannot be said of environmental services from agricultural areas. For example, ecological services that improve water and air quality can be enjoyed by everyone and are, in effect, public goods. In addition, consumers are largely unaware about the role of ecosystem services in their welfare. Under these circumstances, ecosystem services have often been viewed as non-tradable goods, thus leaving farmers with few incentives to protect or enhance them. The reality, however, is that these public goods can easily be degraded and threaten human welfare. In this regard, it is argued that there is a need to make markets for ecosystem services and environmental products more visible to the all stakeholders. Mechanisms which allow farmers to be paid for undertaking measures with environmental benefits are commonly referred to as 'payments for ecosystem [or environmental] services' (PES). These provide financial incentives for farmers to adopt environmental measures. The underlying premise is that farmers have to be paid for delivering a public good as well as for opportunity costs incurred from undertaking environmental measures in their farming systems.

While the market is said to be the major player in PES mechanisms, the reality is that markets for ecosystem services from agricultural environments are still very much undeveloped. In developed countries, most PES initiatives rely on public payment schemes. In the EU, for example, efforts to establish a sustainable agriculture culture have resulted in the development of publicly funded agri-environmental schemes in which farmers voluntarily agree to modify their agricultural activities in favour of sustainability issues. Thus, some 30mn ha of land (24% of available agriculture land) comes under some form of agri-environmental measures. While the use of public funds for sustainable agriculture is feasible in developed countries, we doubt whether the same can be done in developing countries. In Africa, direct payments to farmers using public funds have yet to enter

the political agenda among governments or regional bodies such as SADC or COMESA; thus their acceptability is still unknown.

An important development that may have significant implications for sustainability is the idea of soil carbon markets given the potential to sequester and store soil carbon. The World Bank (among others) argues that soil carbon markets can contribute to farmers' livelihoods by providing payments for generating environmental services. It is argued that this provides incentives for farmers to undertake sustainable agriculture measures that help them to adapt to climate change. Although these ideas are still in their infancy they are likely to dominate future climate change debates, particularly in terms of post-Kyoto climate change mitigation strategies. Doubts remain whether small-scale farmers can benefit from carbon markets considering the nature of property rights in much of Africa and the transaction costs involved. Little is known over the exact impact that such markets would have on poor farmers.

Eco-labelling and premium pricing

An alternative means of providing incentives for farmers and businesses to commit themselves to sustainable practices is the use of eco-labelling and premium pricing. Eco-labels provide an opportunity for agricultural commodities produced in an ecologically sustainable manner to command premium prices. A label acts as a seal of approval that the commodity has been produced in a manner that satisfies established sustainability criteria. The criteria could be resource efficiency or an equity concern. It may also be that the product is organically produced or from a conservation agriculture farm. Some examples of prominent eco-labels include Fair Trade and Rainfall Alliance. While some labels are known internationally, some are fundamentally national. For example, in Zambia, a label known as 'It's wild' is used to market rice and other products produced in an environmentally friendly manner. Some African countries already have their own organic agricultural standards, including Tunisia, Egypt and the East African Community countries of Tanzania, Kenya, Rwanda, Uganda and Burundi.

It is important here that we distinguish between a single attribute label and a multi-attribute label. For a single attribute label, a product need only meet one sustainability element, for example, a reduction in the use of external inputs at the production stage. On the other hand, a multi-attribute label may look at several characteristics or the entire cycle of the agricultural commodity being marketed from production to retail shelf. The credibility of a label can be enhanced through third-party certification where an independent organisation certifies that a particular product meets the set sustainability standard. While it is not rare for producers to certify themselves, for the sake of transparency it is obviously desirable that sustainable agricultural products are certified by an independent organisation. In this regard, it is also important for farmers and retailers to understand the credibility of the organisation behind a label and the criteria followed in the labelling process.

Sustainability thrives on the premise that producers, consumers and businesses all need to be aware of their environmental responsibilities. Eco-labels provide information to retailers and consumers about the sustainability characteristics of the product on the market. For example, the label may show that the product is from organic farms or conservation agriculture farms. The value of eco-label products is growing rapidly. For example, a University of California study notes that retail sales of foods labelled as organic increased from $3.8bn in 1997 to $16.7bn in 2006. A

basic assumption of eco-labelling is that consumers are willing to pay for sustainably produced agricultural products to compensate for the cost of adopting sustainability measures in farming. If consumers are willing to pay for it, then agribusinesses are more likely to invest in measures to improve the environmental quality of their products. UNEP notes that eco-labels provide producers and sellers with an incentive to innovate. For example, they can change inputs or adopt different technologies to lower environmental burdens. It also acts as an important marketing tool with the capacity to improve the image of market participants involved in the production and selling of eco-friendly goods. It is our view that with increasing sustainability concerns, eco-labels will likely become a common feature of the African agriculture sector.

Conclusions

We have highlighted a range of ecological challenges in African agriculture today. We have argued that the twin goals of improving productivity and achieving food security are at much greater risk if these issues are not addressed. While political support continues to be given to capital and technology-intensive production, because of their perceived ability to address Africa's agricultural problems, we believe that the ecological realities confronting the continent demand that attention is also paid to strategies that address these challenges. Sustainable strategies such as organic and conservation agriculture signal the emergence of a new way of thinking in Africa. Although still in their infancy, sustainable agricultural strategies are emerging as important competitors to conventional agricultural strategies. Strategies such as conservation agriculture, for example, are already showing signs of being more productive than conventional agriculture without any need to increase the amount of land cultivated. We would emphasise, however, that to make a fundamental and marked shift into the mainstream these strategies require supportive policies and markets. It is these issues, which are likely to dominate the future debate surrounding sustainable agriculture.

Resource nationalism in agriculture

Nationalism is an infantile disease. It is the measles of mankind – Albert Einstein

Nationalism is power hunger tempered by self-deception – George Orwell

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The policy of state actors to take control of their natural resources sectors is a simple enough concept to understand. Resource nationalism is a phrase with which we have become familiar in recent years, although it is hardly a new phenomenon. The notion became more pertinent in the aftermath of the colonial era as national governments sought to take control of those assets that, in many cases, prompted colonisation in the first place. In a post-colonial era, it could be claimed that resource nationalism has been underpinned by several periods of inflation, most notably in the early 1970s and the rise in commodities prices – the so-called supercycle – that has characterised the past decade.

Any two-minute analysis of the causes of resource nationalism would undoubtedly, nine times out of 10, capture and focus on these two drivers i.e. high prices and post-colonial attitudes. However, as Halina Ward of the International Institute for Environment and Development (IIED) points out, the issue has become more complex in recent years and now incorporates issues such as resource security, climate change, sustainable development and poverty reduction. Ward correctly pinpoints that these are all interrelated and have shifted the terms of the debate from what emerged in the 1960s (i.e. de-colonisation) and the 1970s (i.e. high resource prices).

But if high prices and post-colonial attitudes are historic and practical drivers of resource nationalism, there is another aspect to the subject: namely where the sentiment originates. Ward splits these into two: producer-country nationalism and consumer-country nationalism. Without wishing to overstate the obvious, producer-country nationalism takes place where the resource is based and consumer-country nationalism is where a consuming country seeks to take control of an exogenous resource.

Ward argues that a third strand of resource nationalism has emerged in recent years, driven by the actions of SWFs and external investors and resulting in defensive reactions from countries targeted for investment. In other words, SWF investment is driven neither by producer-country nationalism nor consumer-country nationalism but something specific to the SWFs. There is an element of truth to this observation but we would counterargue that the motives of SWFs are both complex and emphatically not uniform.

To demonstrate this point, consider how the colonialism that characterised earlier ages was not driven by a desire for conquest for the sake of it. The Portuguese, Spanish, British, French and Dutch rarely subjugated populations unless they were adjacent to or above a healthy deposit of some resource whether it was gold, spices or copper.

Even the Chinese who are viewed, often mistakenly, as recent participants in this process have a history of engaging in consumer-country resource nationalism. Consider that during the 1960s, China's deepest period of isolation, Mao Zedong, Julius Nyerere and Kenneth Kaunda co-operated to build the Tanzara railway line, which linked Tanzanian port city of Dar-Es-Salaam with Zambia's copper belt. In other words, China's obsession with industrial production and output was equalled by its need to secure supplies to promote that development as far back as the

1960s. And that type of consumer-resource nationalism is greatly in evidence to this day.

However, can we say the same for Saudi Arabia? Apart from the obvious producer-country nationalism surrounding the formation of Saudi Aramco, which we outline in the following pages, consumer-country nationalism is not a major feature of Saudi Arabian, or most other Gulf-state, overseas investment. That said, we do acknowledge that the Saudi Arabian wheat-growing operations in Egypt fall into this consumer-country nationalism definition. Broadly speaking, however, the drivers of SWF investment either fall into one of the two conventional definitions of resource nationalism or don't qualify as resource nationalism at all. In short, a distinction may be misplaced.

However, where we think Ward's view is prescient is the fact that in the agriculture sector, we may be about to witness a major shift whereby the behaviour of many SWFs converges into the consumer-country category. The growing urgency within China's policymaking circles to secure the country's long-term food needs is mirrored in an increasingly similar situation among the oil-producing nations of the Middle East and one which has been hastened by the Arab Spring.

The oil & gas and mining sectors have shaped the debate in the past and continued to do so in recent years. Thus, before we look at some of the theoretical considerations of resource nationalism and its possible impact on the agriculture sector we turn to how the debate has been framed by these other resource groups.

A brief history of resource nationalism

Not all cases are the straightforward ones of suspending property rights and taking control of private assets with, or without, compensation. Some cases are the more complicated ones of "creeping nationalisation". It could involve regulatory probes on issues as varied as tax-evasion, anti-competitive practices, and negligence with regard to safety, followed by punitive fines and eventually by state takeover. Or, it could be harassment through increased taxes, royalties, and legislation mandating compulsory stakes for the local government. The following provides a broad display of how resource nationalism has been employed in the modern era.

Figure 61: A sample of past instances of nationalism across the world

Country	Action	Industry	Type of nationalism
Iran	Nationalisation of National Iranian Oil Company after the Iranian revolution in 1979	Oil and gas	Nationalisation
Venezuela	Nationalisation of its oil industry in 1975-76; gradual opening up in the 1990s, and then nationalisation again in 2007	Oil and gas	Nationalisation
Saudi Arabia	Full government control of Arabian American Oil Company by 1980	Oil and gas	Nationalisation
Russia	Sakhalin II oil and gas project was accused of environmental violations in 2005-06. However, these allegations disappeared after state-owned Gazprom acquired a majority stake in the project	Oil and gas	Part-nationalisation
Democratic Republic of Congo	In June 2007, newly elected President Joseph Kabila instituted a review of existing mining contracts, a number of which were successfully renegotiated, although some licences were revoked	Mining	Renegotiation of existing contracts
Zambia	In 2008, during a period when commodity prices were rising sharply, Zambia introduced measures to ensure a bigger share of mining profits - royalties increased from 0.6% to 3%, corporate taxes from 25% to 30%, hedging income was separated from mining income for tax purposes, capital allowance depreciation rate lowered from 100% to 25% and a windfall tax was levied	Mining	Rapid increase in taxes during a period of high commodity prices
Zimbabwe	In late 2007, the "Indigenisation and Economic Empowerment Act" was passed by Zimbabwe's parliament and was signed into law on 17 April 2008. This act forced all foreign companies operating in Zimbabwe to have 51% of their equity held by indigenous Zimbabweans.	All	Mandatory local ownership

Source: Renaissance Capital

Iran

AIOC, previously Anglo-Persian Oil Company, had produced oil in Iran since 1913. Its Abadan Refinery was the largest in the world for close to 50 years. As the company prospered, Iranian opposition to the terms of the oil concession grew and negotiations were held between 1928 and 1932 to modify these terms. In 1933, an amended agreement was reached but it was only moderately favourable to Iran. In 1951, the Iranian parliament nationalised AIOC and re-established it as National Iranian Oil Company (NIOC), and the prime minister Mohammed Mossadegh broke off all negotiations. The British government, which had a stake in the company, collaborated with the US and engineered a coup and replaced Mohammed Mossadegh with a pro-Western Prime Minister, Fazlollah Zahedi. However, public opinion remained bitterly opposed to AIOC and it was forced to accept more onerous terms – its shareholding was reduced to 40% of NIOC, and it had to share profits on a 50-50 basis with Iran. After the Iranian revolution of 1979, the complete control of NIOC passed into government hands without any compensation being paid to its private shareholders.

Venezuela

Venezuela nationalised its oil industry in 1975-1976, creating Petróleos de Venezuela S.A. (PdVSA), a state-run oil and natural gas company. The policy was reversed slightly in the 1990s, with certain oil sub-sectors opened to private investment. In 1999, Venezuela opened the entire oil sector to private investment. However, President Hugo Chavez, began to undermine this policy. In 2001, the government decreed that PdVSA was required to have a majority stake in all upstream oil projects. Thereafter, Chavez increased royalties and taxes paid by private companies and rewrote contracts with private players giving PdVSA majority control in most private projects. In 2007, Chavez nationalised the oil industry. Foreign oil companies were forced to sign agreements ceding majority control of projects to PdVSA. Companies that failed to sign the agreements were taken over by PdVSA. The compensation paid to the private investors was based on the book value of assets.

Saudi Arabia

Arabian American Oil Company (or Aramco) had been extracting oil from Saudi Arabia since 1938 after several fruitless years of drilling since 1933. The original shareholders in the concession – Socal, a forerunner of Chevron – sold a 50% stake to Texaco in 1936. In 1950, King Abdul Aziz Ibn Saud, using the possible nationalisation of the country's oil facilities as a bargaining tool, put pressure on Aramco to agree to a 50/50 profit share. In 1973, following US support for Israel during the 1973 Arab-Israeli War, the Saudi government acquired a 25% stake in Aramco. In 1974, this stake was lifted to a majority stake of 60%. The Saudi government took full control of Aramco by 1980. The name Saudi Aramco was adopted in 1988. Compensation paid to the external shareholders was based on book value.

Russia

Resource nationalism has become a common theme in Russia in recent years. What gives it a peculiar Russian twist is that occasionally the nationalism has less to do with foreign ownership and more to do with domestic ownership concentrated among wealthy elites. The saga of Yukos, then one of the largest non-state oil companies in the world, is a case in point. In October 2003, the Russian government arrested Mikhail Khodorkovsky, the majority owner of Yukos on charges of fraud, embezzlement and evasion of taxes. Eventually, all Yukos's assets were dismantled and sold, mostly to state-owned Rosneft, which was subsequently listed on the LSE in 2006.

Thus the Yukos case becomes something of an oddity and cannot be considered resource nationalism in the conventional sense of the phrase, given that the company was owned by Russians nationalised by the Russian state and subsequently privatised through a listing on the LSE thereby bringing in non-Russian shareholders.

An example of resource nationalism in a more conventional sense lies in the development of the Sakhalin II oil & gas project, which was accused of environmental violations by the Russian state in 2005-2006. At that time, it was the only major project that did not include a Russian partner. Eventually, state-owned Gazprom acquired a majority stake in the project and the environmental allegations evaporated.

The Democratic Republic of Congo (DRC)

In June 2007, newly elected President Joseph Kabila instituted a review of 57 existing mining contracts as well as six mining conventions. Although a number of contracts were successfully renegotiated, some licences were revoked. The most prominent dispute involved Canadian mining company First Quantum Minerals and the IFC, the World Bank's private sector arm, whose copper and cobalt mining concessions in Katanga Province were revoked by Presidential Decree in 2010 after a review in mid-2009 by the Congolese government. This case is still subject to ICC arbitration proceedings in Paris.

Again, on the surface at least, this has all the hallmarks of old-fashioned resource nationalism. However, what does provide an additional complication is the fact that unlike many of the oil & gas examples provided earlier, the Kolwezi project,

previously owned and managed by First Quantum, did not transfer directly to a government owned entity. Instead, the asset was sold in January 2011 to Dan Gertler, an Israeli entrepreneur. Moreover, the reviews of mining contracts and the conventions were agreed by most market participants, which seems to suggest the First Quantum dispute was specific to the company. The government also indicated that all future mining discoveries must be state controlled through a 51% equity stake.

Zambia

In 2008, at a time when commodity prices were rising sharply, Zambia introduced measures to ensure a bigger share of mining profits. The move was mistimed, however, catching the downturn in global commodity prices. Tax revenues from copper sales in 2009 were only $78mn, vs $128mn in 2008, despite a 20% increase in output. The measures imposed by the government nullified the development agreements established to govern relationships between the government and mining companies. The new measures included increasing royalties from 0.6% to 3%, raising corporate taxes from 25% to 30%, the separation of hedging income from mining income for tax purposes, lowering the capital allowance depreciation rate from 100% to 25% and levying a windfall tax. However, the windfall tax was later withdrawn following a fall in metals prices and: unsurprisingly, in the wake of a recovery in prices, there have been calls within government and the media to introduce the measure.

Zimbabwe

In late 2007, the Indigenisation and Economic Empowerment Act was passed by Zimbabwe's parliament and signed into law on 17 April 2008. This compelled all foreign companies operating in Zimbabwe to have 51% of their equity held by indigenous Zimbabweans. In 2010 the government followed the passage of the Act with the publication of regulations requiring companies to provide information to the Minister of Youth Development, Indigenisation and Empowerment, as well as including an indigenisation implementation plan by April 2010. This process is ongoing: some of the major mining groups, including the two largest platinum mining groups, Zimplats and Mimosa, both majority-owned by Impala Platinum, were given ultimatums to present their plans for indigenisation or face losing their licences in September 2011.

The Zimbabwe case study sits alongside the complexities of the parallel process of land reform in the country, which has seen ownership of significant tracts of agricultural land shift from local white farmers to black farmers. We look at this issue in greater depth in the section *Runners, riders and the open field*.

Distinguishing resource nationalism and capital surpluses

We have previously taken the view that resource nationalism – especially its consumer-country variety – has had less to do with strategic development, and more to do with the sensible recycling of large current-account surpluses. The persistence of these surpluses and the increasingly strategic thrust of the investments completed perhaps points to a different dynamic than we previously thought. Part of this reflects how we were shaped by our own experiences of Japanese investment in the 1980s,

which seemingly had no centralised strategic theme. After all, acquiring the Rockefeller Centre, Columbia Pictures and various chemicals companies suggests an almost accidental portfolio approach guided by a national need to recycle vast current account surpluses.

Similarly, in the 1980s, when a newly recapitalised British commercial sector effectively backed by oil revenues and a correspondingly strong pound, began to invest overseas, it acquired assets according to private strategic demand and had little to do with consumer-country resource nationalism. That the UK accounted for some 27% of total foreign direct investment in the US at its peak, highlighted the diversity of those investments.

The resource nationalist's toolkit

Before we turn to the potential for resource nationalism to become a more prominent theme in the agriculture sector, we need to turn to the tools available to national governments to enforce the concept. Again, Halina Ward's study on the subject provides some useful techniques, which have been employed widely across the mining and energy sectors. We note some of the more egregious examples from the agriculture sector.

(1) Renegotiation or cancellation of existing natural resource contracts

The renegotiations of mining contracts in Zambia and the DRC fit in with this methodology. The land nationalisation programme in Zimbabwe and its subsequent redistribution to the indigenous population also contains some of these hallmarks. South African land reform, still benign at this stage, has the potential to become more contentious over time. For example, in South Africa, the government holds some 30% of all land, but it remains unaudited in term of its capabilities. Meanwhile, past grievances from the apartheid era are conveniently employed while deficiencies in policymaking over the past 17 years of the post-apartheid era have been ignored according to the opposition.

In short, renegotiation of contracts, whether by coercion or by following the rule of law, is already in evidence across two of the more advanced agriculture landscapes in Africa. Given that African agriculture is likely to expand in much the same manner as Brazilian agriculture did in the 1990s and 2000s, we can see this tactic becoming a major feature of the resource nationalism debate in the years ahead.

A harbinger could be seen in the agriculture sector in May 2011 when media reports claimed that the Ethiopian government had reduced Karuturi Global's (KGL) land concession by a third to 100,000 ha. The reason stated was government concerns over the ability of a single company to manage such a large area and also to enable an annual migration of antelopes. At first glance, this looked like a classic case of renegotiation of an existing contract. However, Karuturi Global swiftly clarified that it would develop 100,000 ha in the first phase and the rest later and thus was in no danger of losing the other 200,000 ha. A false alarm, but perhaps a view of the future.

(2) Rejection of particular kinds of governance frameworks (such as production-sharing contracts)

In a sense, this categorisation is an extension of the previous aspect, i.e. renegotiation or cancellation of contracts. Also worth highlighting is how a number of geostrategic shifts are playing a part in this aspect of resource nationalism. Globalisation, the emergence of the Washington Consensus, the roles of NGOs, supranational authorities have all led to a blurring of the respective roles of the state and the private sector. This allows governance frameworks to be challenged or rejected.

Added to the issues outlined above is a range of other issues which affect governance on many levels; for example, environmental standards, sustainability guidelines, health and safety regulations, subsidy regimes, institutional involvement and so on. In other words, the possibility to interfere in governance frameworks has increased exponentially in recent years.

As an example of this, consider the fact that the WTO's Doha Round (i.e. the round with agriculture and services at its centre) will "celebrate" its 10th anniversary in November 2011. As the longest of the nine rounds since the inception of the WTO's forerunner, the General Agreement on Tariffs and Trade (GATT), in 1947 and involving 153 countries, highlights the difficulties in finding common ground especially in an area like agriculture. In short, the opportunities for resource nationalism to flourish through the workings of governance frameworks are wideranging.

(3) Nationalisation

Nationalisation in the oil & gas sector is obvious and well known: NIOC, Aramco, PdVSA and Yukos represent four prominent nationalisations over the past 50 years. Nationalisation in the agriculture sector, however, is a more complicated affair. This is a slight generalisation but what prevents the agriculture sector being nationalised in the same manner as oil and gas corporations is its fragmentation, i.e. the sector is still dominated by undercapitalised smallholders in contrast with the large corporate entities (and therefore easier targets) that prevail in the oil & gas sector.

Moreover, not only is the sector fragmented, agricultural nationalisations in the past have also usually had disastrous consequences. Usually nationalisation has been associated with collectivisation: the collectivisation of the Soviet Union's agricultural enterprises and the obliteration of the Kulak class in the 1920s were followed by famine in the 1930s. Nationalisation of the Chinese agricultural sector and the obliteration of the landlord class in the 1950s were followed by a famine neatly sandwiched between the Great Leap Forward and the Great Cultural Revolution. The nationalisation of rural land in Ethiopia under Mengistu's regime in the late 1970s resulted in a famine within six years of its implementation

In summary, the nationalisation of land is seemingly counterproductive. In a sector prone to volatile output, highly fragmented and undercapitalised, outright land nationalisations is a dangerous notion. We think even the slowest-witted politician probably recognises this.

Contrast this with the oil & gas sector. It does not matter that PdVSA drills for oil in a complex geology and that it is an inefficient producer. The fact it can still produce an

inefficient 2.2mn bpd of oil a day provides considerable scope for a government-owned corporation to bribe the electorate with its own store of wealth.

However, note the example of resource nationalism of the Yukos affair in Russia outlined earlier. This involved the nationalisation of an existing domestically owned asset, which was eventually sold to international investors and other domestic owners. So, it was different to the other forms of resource nationalism in that foreign involvement remained a lesser issue. This could provide a parallel of what might occur in South Africa and has already happened in Zimbabwe in recent years. It is possible that land nationalisation and redistribution becomes a feature of the South African (SA) landscape in the future. We see clear implications, not just for South African agriculture under this scenario but also for the rest of African agriculture. Just as China needs to diversify its basic food sources to reduce its risk exposure to too few supplier nations, SA farmers are in a similar position and need to diversify into other jurisdictions. For all the talk of SA farmers shifting to places like Georgia and Ukraine, most will continue to work in Africa. Thus any possible nationalisation and/or redistribution of land is likely to provide SSA with a pool of skilled managers capable of resolving the crisis of middle management that is a hallmark of the agriculture industry (see *Runners, riders and the open field*).

(4) Rapid increases in taxes payable by natural resource companies in times of high commodity prices

Again, this was the favoured methodology employed by the Zambian government in its negotiations with the mining companies over the past few years and outlined previously. It is also one of the most effective weapons at the disposal of national governments when they seek to redress some imbalance, grievance or injustice and it has been used with devastating effect in the agriculture sector. One of the most prominent manifestations of this policymaking tool was in Argentina when the government imposed a 10% export tax on primary agriculture produce including soybeans, corn and wheat to replace revenues lost during the collapse of the Convertibility System in December 2001. By November 2007, these taxes had risen sharply – the lowest rate was 28% (wheat) and the highest was 35% (soybeans). Overall, export taxes accounted for some 43% of all taxes paid for the sector. By March 2008, a national strike and a narrow vote in the Senate, prevented agricultural export taxes being raised to a range of 39-44%.

We see another parallel with Argentina as worth highlighting. In 2003, the agriculture sector accounted for some 26% of the government's overall tax take. The relative dependence of the government on this sector is something that might well apply across Africa in the years ahead if the agriculture sector does begin to account for a greater share of GDP.

However, this is possibly a longer-term issue to consider, rather than a short-term one. One crucial difference between the Argentine example and most African countries is that the former concentrated on export taxes which were: 1) relatively easy to enforce, and 2) under the control of the national government, rather than the powerful provincial governments. The fact remains that African food exports are unlikely to be a major theme in the next decade. The continent's $32bn food deficit ensures import substitution is likely to be a greater issue than export-led growth.

The output of land is easy to monitor, and like most resources you can't move it. Therefore, we expect tax raids to become a more important feature of the agricultural sector in the years ahead.

(5) Stringent and mandatory regulation of local content

This is a common feature of oil licensing. In the bids rounds for Nigerian oil blocks in 2000, 2005 and 2006, "local content" was a feature of each round. In this process the bidder had to outline the extent to which Nigerian goods and services would be part of their bid. The original requirement was extended in the 2005 round, when bidders had to establish "local content vehicles" – effectively businesses majority-owned by Nigerians. This was not a new phenomenon: in 1969 – at the earliest stages of development of the Nigerian oil industry – the government set out local content rules with the passage of the Petroleum Act.

Clearly, this tool could be used with relative ease across the agriculture sector. The Russian government proposed a system in March 2009 that would grant subsidised loans on how much local agricultural machinery and primary product were acquired by the borrower. The Ukrainian government is also considering the imposition of legislation that would permit ownership of land, but restrict it to Ukrainian nationals and businesses.

It does not take a huge leap of imagination to see how a localisation policy could be implemented through inputs, on seeds, fertilisers and machinery. Alternatively, we could look at this from the consumer-country nationalism perspective and the ability of foreign donors to use aid and grants to ensure that the consumer country's companies benefitted. We would go as far to suggest that at some point in the next decade, John Deere and China's First Tractor could be involved in some local content dispute in Africa, with argument centred on loans linked to machinery purchases. A common enough theme in the arms industry – we fully expect it to be replicated in the agriculture industry in the years ahead.

(6) Restrictions on exports of natural resource products

This area has seen the clearest example of agriculture resource nationalism. Consider the export bans put in place across multiple countries (Russia, Ukraine, Kazakhstan, Argentina and others) during the 2008 food scare. During that crisis, it was difficult to distinguish how much of policymaking was driven by a genuine fear that continuing to export would have reduced food security levels to dangerous levels, and how much was due to a desire to put a lid on domestic inflationary pressures. Most likely, we believe, it was driven by both factors, and the fact that both existed highlights why policy measures were activated so rapidly.

This is not a monopoly of producer-country resource nationalism; it also has implications for consumer-country resource nationalism. We believe one of the more explosive geostrategic themes over the next two decades will be the need for consumer countries to guarantee food supplies when restrictions are implemented elsewhere. If Iraq was "all about oil" as the phrase has it, we believe it highly likely that at some point in the not-too-distant future, we will see a conflict "all about food".

We would add that this possible enactment of restrictions during periods of food insecurity has possibly hindered investment in the sector. We believe firmly in Friedman's aphorism that "if you put the federal government in charge of the

Sahara, within five years there would be a shortage of sand." We are aware of a number of governments, corporations and funds which hesitate to make investments because of the need for one party to establish an offtake agreement and the other parties to see the potential areas of conflict inherent in that agreement. The logic of the argument is seemingly irrefutable: you cannot achieve food security if it done at the expense of someone else's food security.

This is an area we investigate in other sections of this report. Suffice to say at this juncture this will be one of the most critical aspects of agricultural policy in the years ahead – especially in a part of the world plagued by food insecurity for generations.

(7) Reservation of specified quantities of natural resources, on grounds of national security, food security or energy security

An alternative to outright export bans is to implement a quota system. This is already a standard feature of the agriculture sector. Ukraine implemented a quota system for all cereals in the final quarter of 2010 when a drought hit CIS supplies – in contrast with Russia, which implemented an export ban similar to that initiated in 2008. The quota system in Ukraine permitted 3mnt of maize exports and 1mnt of wheat exports.

We believe this is likely to become a major feature of the agriculture sector in Africa in the years ahead. Where it becomes more controversial is that in Africa, droughts and shortfalls can be replaced by more ominous words like famine. As noted above, we do not think it will be politically possible for the export of food to take place when parts of Africa suffer from reasonably regular periods of food shortages. In short, we think quotas are likely to become a component of the resource nationalism debate in the years ahead.

(8) Requirements for investors to make increasing contributions to direct social spending by executing infrastructure projects; or investing in a variety of social investment projects in localities; or at the national level where they invest

We believe this is likely to play a major part in government policies in the years ahead. However in our view, the sensitivities surrounding land, agriculture, food and exports are all so apparent in Africa that the investor that fails to put social policy at the heart of his or her investment programme is likely to suffer a major commercial handicap in the years ahead.

Governance across much of Sub-Saharan Africa is weak, and has been replaced, to an extent, by that provided by international institutions and NGOs. This feeds down into many programmes tailored by investing organisations. Clearly, this might change over time as institutions are strengthened and the wealth effect begins to spread. However, it is likely to be a focal point going forward, and we have no doubt it could be used to promote resource nationalism.

Future flashpoints

If these are some of the direct and indirect means available to enforce resource nationalism, what does the future hold, specifically in terms of African agriculture? In its simplest terms, Africa has productive potential while China has long-term strategic needs across a range of key grains and oilseeds. Yet, to date, China's investment policy in overseas food supply has been tactical and marginal, rather than strategic and wide-ranging. Why is this the case? And why it is different to the experience in the energy and the mining sectors where China has gone to considerable lengths to secure oil and mineral supplies?

The reasons are fourfold, in our view: two are political, and two structural:

The primary political issue is clear: despite its long-term strategic food needs, China can, in the short-to-medium term, rely on a narrow range of strategic suppliers such as Brazil, Argentina and the US until it figures out a way to bring other strategic suppliers into play. This lack of diversification is offset by the fact that while the Americas may be a stopgap measure for China, it could at least endure for years. In a sense, we acknowledge this issue (see our previous comments on resource nationalism).

The second political theme is that land remains a deeply sensitive issue. Consider that China, in addition to other food importing emerging markets, has three ways of securing supplies: it can buy land and farm it, lease land and farm it, or secure supplies through off-take agreements. None of these issues is uncontroversial. The ownership of land is political, leasing the land still suggests disruption whether social or economic, and finally the establishment of an offtake agreement, despite the comforting absence of ownership or leasing rights, would have major political ramifications in the event of a famine.

Consider the case of Daewoo in Madagascar – now a cautionary tale for prospective agricultural investors and host governments. In late 2008, South Korea's Daewoo Logistics negotiated a 99-year lease on some 1.3mn ha of land in Madagascar – nearly half the country's arable area – to grow corn and oil palm. The massive scale of the project and the generous terms that Daewoo received fuelled widespread protests against the deal and the government. While not the sole cause, opposition to the deal was one of the reasons for the eventual downfall of then president, Marc Ravalomanana.

The first structural reason why China has not invested heavily in the African agriculture sector directly is the fragmented nature of the sector. As we noted earlier, acquiring a deposit of oil and getting it out of the ground and into a refined state within your own market – despite any geological and engineering challenges along the way – is relatively straightforward compared to building an agriculture supply chain. Perhaps we can summarise best this way: the oil industry has plenty of middle managers who can get oil from A to B. Agriculture lacks an industrial middle management capable of doing the same. This is an issue we explore in greater detail in the section *Runners, riders and the open field*. To emphasise the point of fragmentation vs concentration: ask which is easier to implement – an effective scorched-earth policy on agricultural land, or a scorched earth policy on oil wells (as conducted, for example, by retreating Iraqi forces fleeing Kuwait).

The second structural reason is the lack of an integrated approach to agriculture investment. Unfortunately one of the biggest challenges in agriculture, especially in areas where farming is already marginal, is to see beyond the individual assets and ask how integrated they are. Therefore, an agricultural land bank is worthless if you have to travel 300 km for a bag of fertiliser or 600 km to a processing facility. What use are empty grain silos if you have nothing to fill them with? Even if you have storage facilities and productive farmers filling them do you also have relationships with food processors to ensure a market for the basic product? The inability of many investors to take an integrated approach to agriculture is usually why so many of them become, or will become, distressed assets.

To answer all four points requires a great deal of imagination, strategic foresight and execution skill; and given the lengthy lead times in agriculture it is hardly surprising that the level of investment among the food-consumer countries, or their proxies, has been marginal, despite their long-term needs.

Where agriculture may mirror other natural resource sectors

As can be seen from the examples outlined above, we conclude that several themes might play out across the agriculture sector with particular reference to resource nationalism in the years ahead. Clearly, the conditions that characterised an earlier wave of resource nationalism in the energy sector in the post-WWII landscape (high prices and anti-colonial sentiment) remain capable of acting as catalysts in the agriculture sector.

High prices are a predictable catalyst for resource nationalism. Undoubtedly there are examples where resource nationalism was conducted in an era when oil and gas prices were not necessarily high (the nationalisation of the NIOC in the early 1950s was a prominent example). Nevertheless, the bulk of nationalisation or renegotiation of contracts, shareholdings and so on took place when prices were high. Even the full nationalisation of the NIOC did not take place until 1980.

Throughout this section we have focused on resource nationalism as an issue that connects internal and external forces. However, within the agriculture sector, the flashpoints are equally likely to be internal. As noted in the urbanisation-focused section of this report, the newly urbanised seem to be among the biggest buyers of agricultural land outside the cities. Accordingly, the areas of friction in the next few years are equally likely to be domestic affairs driven by divisions among the urban rich, the urban poor and the rural poor, as they are by external forces.

Figure 62 highlights some prominent examples of resource nationalism, primarily trade restrictions that were imposed during the 2007-2008 commodities price rise.

Figure 62: A sample of trade restrictions imposed during 2007-2008

Date	Country	Commodity	Action
November 2007	India	Rice	Ban on non-basmati rice exports
March 2008	Vietnam	Rice	Tightening of export restrictions
April 2008	India	Rice	Export tax on premium basmati rice
March 2007	Argentina	Wheat	Ban on exports
July 2007	Ukraine	Wheat	Strict export quotas
November 2007	Russia	Wheat	Export tax
April 2008	Kazakhstan	Wheat	Ban on exports
December 2007	China	Grains and oilseeds	Removal of VAT rebate for exports
January 2008	China	Grains and oilseeds	Export tax

Source: Defra (UK), FAO, Renaissance Capital

Free market vs closed market

At the heart of the issue over resource nationalism is a paradox. On one hand, the opening up of agricultural markets in the past decade, the establishment of new production centres and a continuous improvement in investment flows into the sector all suggest – theoretically at least – that agriculture is opening up, liberalising and becoming much more free. One might even extrapolate this into a view that the Washington Consensus is coming to agriculture as the sector takes on more of an industrial and corporate form.

But while it is an easy – and appealing – picture to paint, it is an inaccurate reflection of what is likely. In reality, just as it has always been, the agriculture sector will remain a series of paradoxes, contradictions and inconsistencies. So, while the language of the free market will be spoken, the underlying reality will still involve subsidies, co-operatives, government controls and an array of taxes, controls, checks, balances and bureaucracy.

But this is not new. John Kenneth Galbraith's view expressed in The New Industrial Estate in the late-1950s understood how markets and bureaucracy would need to rub alongside one another. Many years ago when one of the authors of this section was scribbling away in Hong Kong, he would see this concept in practice. While the Crown Colony was viewed as a paragon of free-market virtue, it was in reality, dominated by private-sector cartels or regulated duopolies and monopolies. We believe it is fitting to see the agriculture sector in these terms.

So this brings us to a conclusion: resource nationalism is a fact of life in the energy and mining sectors. It will likely become a major feature of the agriculture sector in the years ahead, as well. However, there are crucial differences, including the fragmentation of the latter vs the former. It will also act as a brake on investment unless the process is managed well by investors and governments. We emphasise that the existence of resource nationalism does not necessarily imply an ill-functioning market; rather it may well mirror other conventional industrial sectors where ownership restrictions have been a fact of life for decades.

The lessons we draw from the Cerrado transformation, for Africa, are simple – government policies that offer incentives to agriculture, a favourable investment climate, availability of credit, investment in infrastructure, improved access to markets and investment in technology. Africa is currently lagging behind in most of these aspects, although some countries are ahead of the rest.

Case study

Joint Aid Management

In this section of the report Isak Pretorius, CEO of African Commercial Development, and James Lutzweiler, Vice-President of Strategic Development at Joint Aid Management, outline the organisation's strategy, outlook, and the model it is using to promote sustainable assistance to some of Africa's poorest regions.

Those NGOs with an anti-development agenda can take their business elsewhere – Oluniyi Robbin-Coker (Economic Adviser to President Koroma of Sierra Leone)

What has caused more misery than the follies of the compassionate? – Friedrich Nietzsche

Isak Pretorius
African Commercial Development

James Lutzweiler
Joint Aid Management

What is Joint Aid Management?

Joint Aid Management (JAM) began 27 years ago during the famine and crisis in Mozambique in the early 1980s. Responding to widespread suffering, a South African businessman, Peter Pretorius, invested all he had to begin a vocation to reach those who were dying of hunger. In 1984, he was stranded in Pambarra, Mozambique, at a food distribution centre for 10 days without food or a change of clothes alongside 34,000 starving people. Each day more than 30 people died and he helped bury them in shallow trench graves. Broken by the reality of this suffering, Peter resolved to feed and help as many people as possible.

To meet the needs of remote victims, JAM's managers learned how to manufacture fortified blended foods and provide logistics, transport and storage in areas with little infrastructure. JAM developed its own end-to-end supply chain capabilities, built manufacturing facilities, procured regional commodities, established trucking fleets and provided warehouse space, scheduling and maintenance. After the war in Mozambique, JAM evolved into one of the largest school feeding organisations in Africa. Today, it feeds over 700,000 children each school day in Angola, Mozambique, South Africa and South Sudan.

This work continues, but JAM acknowledges the need to face the issue of *sustainability*. School feeding programmes are not sustainable since primary school students are not a market. However, providing a daily school meal has a hugely positive impact on the academic and general well being of students. Accordingly, JAM works with host governments to create national school feeding programmes funded by national budget expenditure and creating opportunities for corporate sponsors to join hands with government. While it may not be sustainable in a commercial sense (i.e. a viable business), JAM notes that it has the potential to be sustainable in a social welfare sense.

Since school feeding represents 75% of the organisation's income, JAM found it necessary to reflect on the reality of sustainability and look at what its humanitarian interventions were doing. The organisation concluded that all its interventions were unsustainable unless it fundamentally altered its approach to the question of aid.

Although JAM had established a solid supply chain organisation and commercial expertise, it was developed out of need, not profit. The aim was only to feed children while the value added in the business transactions were of secondary concern. The perspective was one of charity rather than investing in a supply chain. The outcome was the priority and the process was important only to the extent that it supported

the outcome. Despite the possibility to add value to the processing and movement of blended foods, many commercial opportunities were overlooked because JAM did not consider how to use this infrastructure to leverage commercial business – particularly in the agriculture value chain. The organisation kept coming back to the same question: *could it remain true to our mission and do business at the same time?*

In the debates over development aid, there are well-founded reasons to join the bandwagon of critics. There is a deep and prestigious literature replete with examples of how aid has failed to bring about positive change in the lives of those ravaged by poverty. What JAM presents here, however, is not a tale of failure but rather a vision for success borne out of decades of well-meaning but fundamentally flawed aid programmes.

Criticism of development aid focuses on foreign bilateral government aid, development industry contractors, humanitarian aid and pure charity. For convenience, let us call this group *the aid industry*. Each of these four categories ought to have an interdependent role to facilitate outcomes in favour of the impoverished. Unfortunately, the aid industry has, for most of its history, either misunderstood or misdirected the promise to *help*. Passion and energy that has been spent over decades of unmet expectation needs to take a new approach. Above all it needs to demonstrate that charitable aid is noble but investment [as aid] is divine.

JAM has firm roots in humanitarian aid: its programmes focus on nutritional feeding, school feeding, assistance to orphans and vulnerable children, the provision of water and sanitation as well as skills development and community training. JAM believes that without education there can be no development – and without adequate nutrition there cannot be effective education.

Feeding children, partnering with communities to address health and social issues and providing comfort from the distress of poverty is widely accepted as, instinctively, the right thing to do. However, this action alone is insufficient and unsustainable, in JAM's view. It believes the current development aid model promotes a myth of sustainability. In fact, pause to consider the term "sustainable development," popularised in the 1987 publication, *Our Common Future*.

It is actually a tautology that has defined two generations of development theory. It stands to reason that if an aid programme is not *sustainable*, it is not development. The term was composed originally to establish a link between meeting the needs of the poor and concerns for the environment's ability to meet those needs. It has become, however, the myth of development, because the theory was predicated on the notion of aid as charity—meeting the needs of the poor—instead of being driven by how to create wealth among developing nations to eradicate poverty.

Thus, donors and development practitioners today at the end of each funding proposal are compelled to explain how the funds and activities will be sustainable--the veritable Holy Grail of development. The reality is, however, that the current aid model must integrate with the commercial sector. Six generations and an entire aid industry have been predicated on giving at the expense of investing. Michael Maren's *The Road To Hell* raised these issues as far back as 1997 and another generation has continued to give in the intervening years.

Given this collective, credible body of evidence JAM finds itself at a point that forces the aid industry to answer an uncomfortable question: can humanitarian organisations preserve their noble posture when outcomes are tied to commercial development? Has imbalanced economic growth preserved poverty? This is where the discussion must now begin and how the issue must be framed. The aim of development must be changed from a never-ending subsidy to the supposedly permanently helpless poor to a transformation of those poor into self-sustaining, self-perpetuating producers of wealth.

Ideological struggles

JAM's struggle with this question is not new. An ideological battle, at one point involving the WTO, emerged in 2005 as to the appropriateness of in-kind food aid, even calling into question whether its underpinnings were moral. The point here is not to argue the merits of in-kind food aid but to show how old model thinking was being argued in a well-meaning way. The notion of "local purchase" was touted at the time as a solution to combat the predatory practice of agricultural subsidies in the West and directly support millions of local smallholder farmers, bypassing the immoral and ignoble commercial farming establishment and the government policies that upheld them. The problem was that a Washington consensus of NGOs knew that business needed to be done in a new way but just couldn't fathom that the solution they were seeking rested in reaching out to the commercial enemy they were attacking, thus continuing an entrenched policy tradition of well-meaning NGOs.

JAM argued that the proposed policy solution was being made without a clear understanding of its practical outcomes. Hunger is not going to be eliminated solely by directing money from foreign donors into recipient markets, particularly in the absence of significant institutional, structural and policy change in those markets. You can't fill a bucket riddled with holes. In this case, the water is proposed massive increases in foreign aid, and the bucket riddled with holes is the current state of most agricultural markets in the developing world.

Specifically, the increased foreign aid is not going to be benign and will most likely exacerbate the problem. In 2005/2006 local purchase studies conducted by the WFP in Uganda and Ethiopia bore some startling results for the supporters of local purchase. They discovered that a few individuals heavily influence weak commodity markets. In effect they become price setters in local markets. Thus, well-meaning NGOs were actually supporting policies that fostered more unstable agricultural markets and created price fluctuations that either harmed local smallholder farm gate prices (since they are price takers) or increased the market price for consumers.

Around the time of this debate, an article was published in *Business Report* on 29 October 2008 stating that South Africa was looking to: 1) protect its markets from imports in certain sectors, 2) strengthen its position with strategic grain reserves, and 3) implement stronger protective agricultural policies to stabilise domestic supply. The most significant effect of this policy shift was on the distribution of commodities around the region, which were meant to address other countries' food insecurity problems. The WFP spent approximately $280mn in Southern African local (i.e. regional) purchases in 2007, buying from South African markets and

distributing throughout the region. That was a significant contribution to rein in the outflow of commodities and reduced domestic supplies. This was implemented by the strongest agricultural economy in Africa as considered how to protect itself from an impending food crisis. It was an exemplary step taken to prevent a crisis before it erupted.

This discussion is important because it pinpoints a mentality that needs to change. NGOs know they need to engage in agricultural markets but, because of a perpetuated myth of neutrality and impartiality, they operate above the system. NGOs wanted to play by a set of flawed rules, ignoring how the world really works. The net effect of local purchase is that government "aid" agencies are becoming commercial traders and creating false markets within an agricultural economy. In order to sustain a market presence, there would have to be long-term funding for local purchase, which isn't feasible or desirable. In short, it's not *sustainable*.

This policy debate pushed JAM's management to understand its role not only as humanitarians but also as businessmen. Clearly development theory isn't working and NGO's are neither equipped nor mandated to operate in the commercial sphere. Thus, JAM was left with a choice either to continue in a tradition of charity or engage properly in commercial activity. It chose the latter and established a for-profit business that will focus primarily on agricultural development in Africa - **African Commercial Development (ACD)**.

Given JAM's supply-chain experience across many countries, ACD's business model reflects a desire to own or invest in as many links in the supply chain as possible. Commercial failure across the continent is caused by constraints that would cause a business to fail anywhere in the world: single product factories that do not operate year–round, and therefore suffer from high unit costs, the difficulties of maintaining skilled staff, poor health conditions of the workforce, lack of education, lack of critical mass, poor farming techniques and lack of inputs. All of these create a weak environment to attract investment capital and promote economic growth.

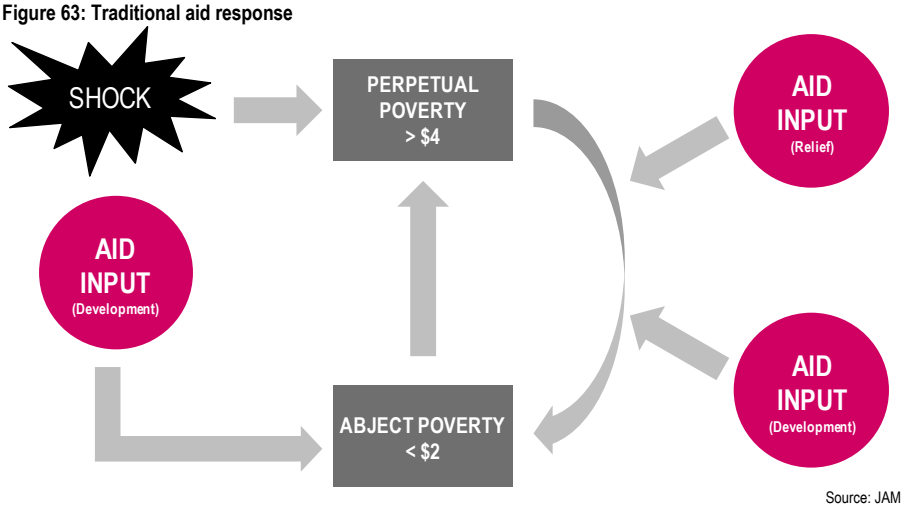
The cycle of perpetual poverty

How is it that decades of work and billions of dollars applied via the aid industry a cycle of poverty has been perpetuated and reinforced? A community living in abject poverty (i.e., less than $2 per day) is a common recipient of international aid. These inputs arrive in different forms, either in microcredit loans or through numerous donor-led projects. Aid artificially props up the community or individual and often accomplishes what the international aid industry refers to as community development. This assistance injects people into a new reality, often doubling or tripling an income to $4 or $6 per day, temporarily improving and saving lives. However, while this certainly improves lives, it does not truly offer a long-term solution to poverty. While $4 or $6 per day may not be abject poverty, it is still poverty.

Despite real change in Africa, vulnerable communities remain exposed to common shocks. When universal shocks such as wars, droughts, floods and other natural or man-made disasters occur, a $4-a-day community will lack the resilience to absorb these shocks and the realities of everyday life. Without that ability, a community,

which has enjoyed an improvement from the traditional community development project, will immediately return to abject poverty. In an emergency, the international aid community will again inject aid dollars back into a vulnerable community in the form of emergency relief aid and later development aid. That system of aid has perpetuated a cycle of dependency because it never addresses the long-term reasons why people need help or their need to create resilient communities.

Figure 63: Traditional aid response



Source: JAM

True development

In order to create lasting change the international development industry needs to re-focus its efforts on true growth and development. Rather than present solutions that bring communities and individuals from abject poverty to a higher level of poverty, our industry must aim higher and break this cycle. True development is a system that develops communities to the point that they can resist common vulnerabilities The key to this goal is to link communities into world markets, using the resources and industry that most communities can easily access and currently utilise: the agricultural sector.

The success of the US and other western democracies is due, in part, to the modernisation of the agricultural sector. As US commercial farms expanded, more subsistence smallholder farmers moved off the land and into other industries. Support industries developed, fostering growth in both the agricultural and industrial sectors. By applying the lessons learned from historical successes in the United States and elsewhere, the importance of sustained real economic growth is recognised. Current aid structures, however, stymie this growth by artificially inflating economies and denying necessary growth. Perhaps, this could be seen as an African version of Dutch disease. A bridging mechanism is required then to facilitate the inclusion of the African agricultural sector into the modern global economy. Only by generating demand for African output can sustained growth occur.

In a 2009 article in *Foreign Policy* magazine, Robert Paarlberg pointed out that 60% of all Africans live and farm in rural areas, often making less than $1 per day. *"These farmers' crops yields are only about 20 percent as high as in Europe and the United States because they lack all the basic necessities for productive farming: improved seeds, fertilizers, water, electrical power, education and rural roads to connect them*

to markets." Nevertheless, rather than investing in agricultural development, over the past three decades *"the United States has cut its agricultural development assistance budget for Africa by 85 percent. The United States now spends 20 times as much on food aid to Africa as it spends on agricultural development to help African feed themselves"*. Paarlberg urges that *"fixing this dysfunctional imbalance is the true key to ending hunger."*

It is through investment in the agricultural sector that Africa will start to develop key institutions, markets, infrastructure and technology that are crucial to the creation of "true development." By integrating smallholder farms and subsistence farmers into commercial farms with increased access to greater markets on a national, regional, and international scale, we can break out of the cycle of perpetual poverty.

Sustainable development is further characterised by a community's ability to create and accumulate wealth rather than simply trying to survive. Subsistence communities are unfamiliar with wealth creation and accumulation but more simply with survival. In contrast, the paradigm shift in development that JAM envisions will, it hopes, result in the integration of the economically poor into a commercial value chain with national, regional, and international reach. Through a three-point programme of: 1) developing micro-economies, 2) introducing subsistence communities to access and linkages into a better market system, and 3) mentoring such communities to move from a smallholder society to that of an integrated agricultural economy, infrastructure can be modernised and formal and lasting employment created in a sector where risk, instability and food insecurity can be managed.

Traditional aid projects only reinforce smallholder famers as subsistence farmers. Rather than reinforcing subsistence farmers' position at this level, JAM asserts that the systems and capacity must be created for them to become commercial farmers. Through the creation of commercial farms and a more integrated farming industry, African populations can begin to create and accumulate wealth. These micro-economies will then result in numerous support industries (see below) and further market development—thus creating a formal employment sector of entrepreneurs and employees rather than numerous smallholders competing continuously in a self-defeating cycle.

Modernisation of the agriculture sector will lead to the development of support industries such as logistics networks, secondary and tertiary processing plants, retail outlets and many other small industries. Low-yield and subsistence farming will give way to a system of mutual beneficiaries rather than self-defeating competition. Rather than flooding a market with numerous examples of the same product, as many development projects accomplish, it is possible to create and foster the need for new support products and industries.

The key thing here is that by creating a successful agribusiness, former subsistence farmers move into other sub-sectors along the agriculture value chain. New industries and diversification mean a society that has the ability to absorb shocks and that should mean an end to dependency on the international aid system.

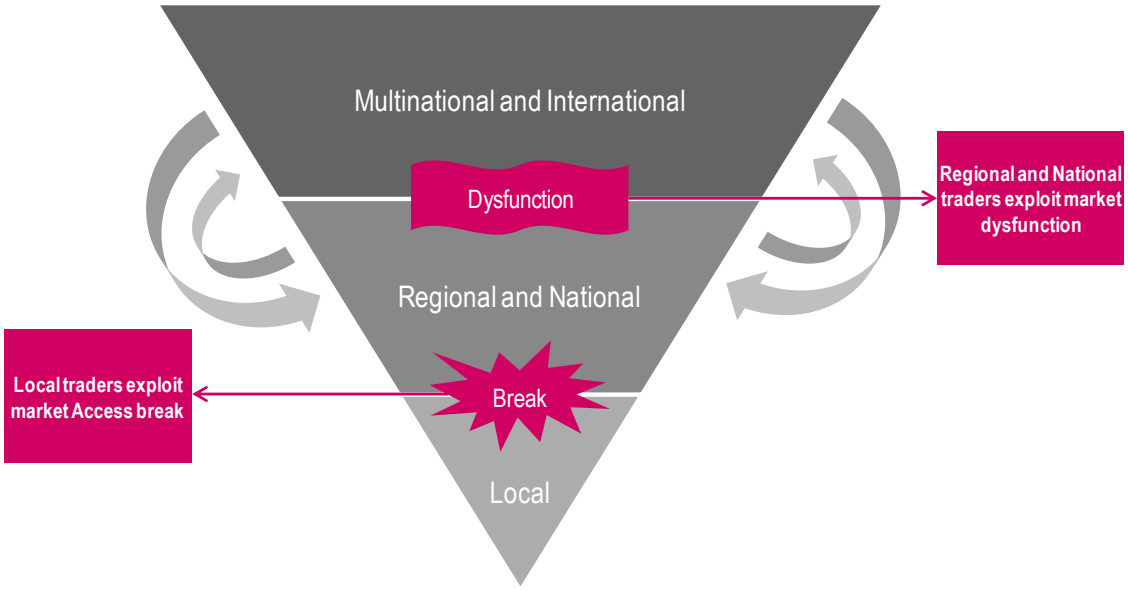
Joined-up markets

African agricultural markets are often isolated and fragmented. Where trading does exist it is often thwarted by severe market dysfunction. To understand how a functioning market ought to work, consider three separate players:

1. Local communities
2. Regional and national groups and alliances
3. International and multinational entities

While agricultural trade does exist in Africa, it often cannot successfully access these other two players.

Figure 64: The problem



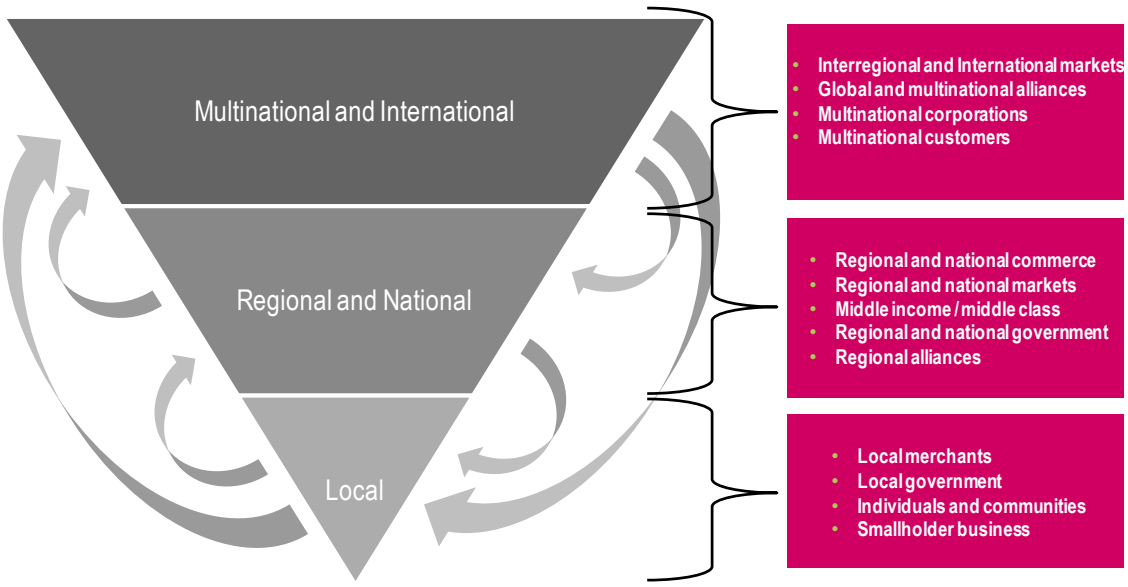
Source: JAM

Figure 64 illustrates these relationships. Local farmers and traders have limited access up the chain where true opportunity lies due to severe market dislocations. Where trade does exist in the system, local traders often exploit this market imperfection for their own gain. The “local” smallholder Angolan tomato farmer is confined to his village or city market, often with hundreds of small farmers selling the same product at the same price. In the event that the farmer does have access to a trader, the latter exploits the former’s lack of options and therefore he receives lower prices for his commodities. While there is interaction between the international and regional levels, these relationships are characterised by chronic dysfunction.

The smallholder farmer in Angola who farms on 1 ha of land may produce 1-1.5 tons of tomatoes. The smallholder lacks infrastructure, storage and transport. He or she can only access a local market. His only opportunity for resale is a trader who gives him a set price for the product. This same trader may sell the same product at the regional level for three-to-four times the price offered to the smallholder. As a result, the true value and is never transferred down to the undercapitalised farmer.

How does one go about eradicating these market inefficiencies to create true commercial market linkages across Africa? The solution is to create local markets that have the capacity to feed into reliable regional and international markets, which in turn, have the capacity to move products and commodities through the value chain while receiving the benefits of trade as it moves down the chain. This results in a system where the local markets feed into and are reliant on national, regional, and international markets—and in turn, these markets are reliant on local markets. These links create proper market access and foster international alliances and relationships that will have the capacity to create a major customer base for African agribusiness products.

Figure 65: Commercial market linkages and relationship map



Source: JAM

By developing links among the three entities illustrated in the figure above, market dysfunction could be eliminated. Giving the Angolan tomato farmer options and access will increase his productive capacity as well as providing him or her with improved cash flows and the opportunity to accumulate capital and wealth. Traditional aid in providing assistance to these smallholder farmers in purchasing seeds, fertilisers and so on, thus becomes proper investment in moving them to a future of self sufficiency through increased yields and higher prices for their output.

All these developments promote the development of an African middle class. The virtuous circle of wealth accumulation brings higher savings rates and this brings in additional investment. And the emergence of an African middle class results in political change as well as governments finding themselves answerable to taxpayers, rather than the aid industry.

Why JAM – ACD?

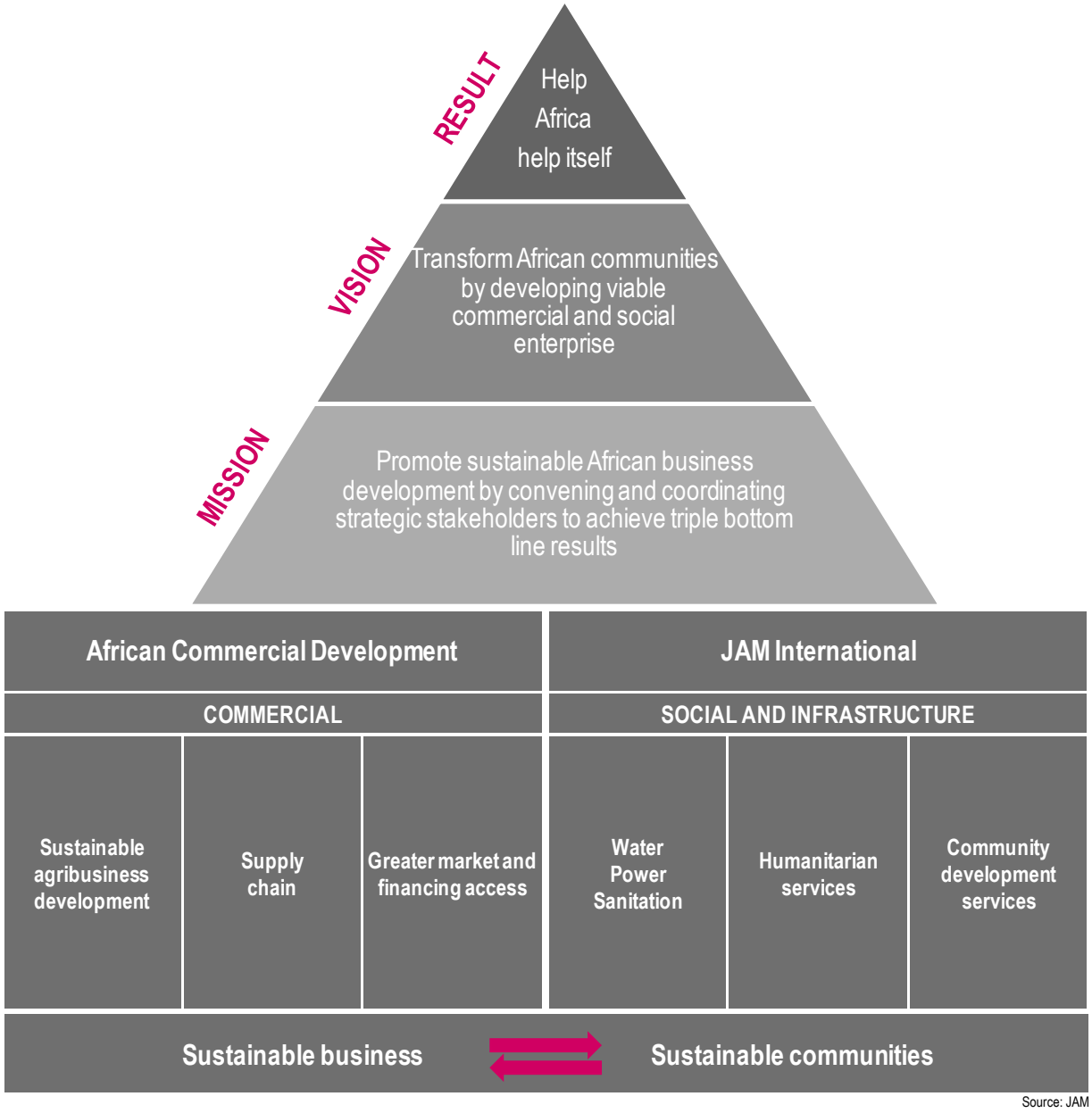
Facing these challenges is not academic, according to JAM. The organisation asserts that an effective agri-consumer business in Africa means having a physical presence, networks of colleagues, strong government relationships, a reputation for integrity and a diversified strategy for both agricultural inputs and outputs. JAM claims the ability to knit the “aid” and the “development” components together to create sustainable communities and businesses. It can access government aid funding to conduct agricultural training and implement education, healthcare, and nutrition programmes in a targeted and coordinated manner.

Companies can attempt the same but at great cost and with the likelihood of low returns. Failed aid programmes are easily paralleled by failed corporate community engagement in Africa. This model allows corporates to do what they are good at – doing business and making returns for investors – and allows the humanitarian partner to engage with communities. JAM – ACD aims to bridge the two.

Practical applications

To begin the process of linking local smallholder farmers into a true market system, JAM - ACD is in the process of establishing a large-scale commercial farm in Mozambique. By working in partnership with existing commercial farms, JAM is looking to provide a bridge between local smallholder farms and international retailers. It has developed a system of mentoring whereby JAM guides smallholders through the process of modernising and developing their resources to their full potential. The organisation reports that initial tests conducted in Ghana suggest that with these measures, it can double maize yields from 1.5 t/ha to 3 t/ha. Thus a simple system of mentoring and knowledge sharing could take those yields still further. Once the venture comes to fruition, we believe that more efficient smallholder farming businesses can take their own high-yield production while ACD has the capacity to service offtake agreements with international retailers.

Figure 66: JAM – vision and mission for Africa



Source: JAM

Transitional finance

The methodology of this development intervention is known as transitional finance (TF), a term coined by JAM in 2009. TF is a newly structured financial tool designed to advance a trade-based model for development in Africa by giving African agricultural entrepreneurs the tools and training they need to overcome poverty. Traditional microfinance projects have succeeded in bringing stakeholders out of abject poverty by providing them with much-needed investment opportunities.

However, JAM believes a gap still exists between individual/family level microfinance loans from and the business of commercial loans. TF acts as a bridge between these two loan spectrums. Whereas a $225 microfinance loan can help subsistence farmers by increasing their living wages from $2/day to $4/day, TF should be able to take those same emerging smallholder farmers into strong commercial agreements with input and equipment suppliers, offtake partners, irrigation and logistics groups and so on. JAM estimates that a three-year loan of $4,500 can make a significant difference to output. To gain funding, farmers must demonstrate an ability to thrive in a commercial setting while mentoring and supporting other farmers in the community to improve their capacity. Farmers who participate in TF become investors back into the TF model to benefit other farmers. TF brings ownership, partnership and responsibility as well as binding communities together through economic growth.

The way forward

JAM fostered the concept of ACD, but the new company is a strategic joint venture with a Zimbabwean investment institution, Tetrad Group, which itself was founded in 1995. Both companies are committed to meaningful expansion into Africa's agricultural supply chain and support industries. Therefore, ACD is a combination of practical supply chain experience and financial services and structuring expertise. Our vision is to demonstrate to investors that unlocking the potential of commercial scale production and logistics is not only possible, but has already begun.

The aid industry and other benefactors want to support Africa's small-scale farmers because they feel this is the most expedient route to scale up the impact of their donations, but this is not the long-term solution for Africa's – or the world's – agricultural needs. The TF model is meant to capture a new vision for Africa's small-scale farmers – one of emerging commercial farmer – connected to newly formed commodity value chains feeding into global supply chains.

The current challenges are significant. The first challenge is to convince investors to see the opportunity; the next is to convince them to be patient. Anyone who sells quick returns in Africa is likely not your best partner. What might be considered a small investment outside the continent ($1-5mn) is considerable in most agriculture projects. Larger projects may attract the scale necessary to attract investors and if packaged correctly can be quite powerful. However, country-specific agriculture markets need to expand from small beginnings.

The second challenge is to identify those strategic investments that will form the building blocks of a stable agricultural economy. Ghana and Ethiopia have succeeded in developing speciality crops market in cocoa and coffee respectively and other countries such as Rwanda and Uganda have followed this lead. Focused investment in niche markets has provided attractive returns for investors. Similar examples can be found in the fresh cut-flower business in Kenya and fish farming in Tanzania. Yet, while these businesses are profitable, they do not constitute a broad agriculture sector. This will be achieved only when primary production of staple crops such as maize, soya, and wheat are established and become profitable. That will induce significant investment in infrastructure, logistics, transport networks, and export facilities. However, to get to the point where the business is regularly

attracting $100m investments requires patience. Achieving scale will not happen overnight.

The third challenge is to identify the right set of strategic partners. An entire value-chain approach demands strong partnerships and joint ventures. Companies that have evolved to own large sections of the supply chain in the West need to understand that while this is the correct approach, it needs to be adapted in Africa's complex markets.

Runners, riders and the open field

I was seldom able to see an opportunity until it had long ceased to be one – Mark Twain

We had to scramble to mount some reach and get into places and be competitive on the ground – Brit Hume

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Go back six years and try to frame a view of African agriculture. Certainly, the global sector has its large, liquid components – fertilisers, seeds and trading are prominent, Geographically, most of the action – If that isn't too dramatic a term for a sector, which still constitutes a small component of most investment portfolios – was in the CIS, Latin America and parts of Asia. Africa was barely a blip on the global agriculture radar screen.

How things change. As we noted earlier growing needs across a range of emerging markets means that Africa is at the epicentre of the structural shifts influencing the sector. Undoubtedly investment in the sector – specifically its African arm – remains at the pioneering stage. However, that is changing rapidly. To say that it is fast becoming mainstream would be little more than cheap talk but it is rapidly entering the collective mindset.

In terms of external participation, a number of frontier investors are prominent in private equity and some hedge funds have invested in a number of projects across the Continent. What has also sparked the most interest, however, is the emergence of Chinese state-owned enterprises, Middle East sovereign wealth funds (SWF) and a raft of Indian, Malaysian and Singaporean commercial businesses.

Meanwhile, Brazil has become extensively involved through the involvement of EMBRAPA, the research organisation established by the government in 1973 to promote development of Brazil's agriculture sector. The World Bank's commercial arm, the IFC, is also heavily involved in the sector. And then there is the unique status of the old South African co-operatives, which have been transformed into broad agribusinesses in recent years. The likes of Afgri and Senwes will most likely have a role to play in another transformation – that of African agriculture.

These different investors follow different strategies. Some buy or lease large tracts of land and grow the crops they choose; others have small directly owned operations and complement it with out-grower schemes; some collaborate on research. So, broadly, it is either a land-based strategy or IP-based. We believe it would be instructive to compare and contrast these different strategies.

The most common route, and one that has attracted largely negative attention, is the land-based one. Media stories on large land deals in Africa appear at regular intervals, peppered with the phrases "land grab", "new scramble for Africa" and so on. No doubt a number of these transactions provide few benefits to the local population, but we also believe that, if done correctly, these large-scale farming operations have the potential to contribute positively to food security in Africa and possibly the world.

Consider the strategy of SWFs. In our view, the food security angle that is pitched as the reason for investment is in reality a new objective. In the past, much of the investment was simply the recycling of current account surpluses – an issue we have explored in the section in the section on food security. This realignment of objectives is nothing new and something one of the authors witnessed more than a

decade back when we happened to be involved in an offshore development scheme in a Gulf State. Originally, the development was little more than a property venture but turned into a communications hub as the TMT bubble expanded. Once it had burst, the investment opportunity metamorphosed into the creation of a financial hub. Once that bubble burst, it reverted to a property venture.

The point is not to denigrate the motives of SWFs in their African investment plans. Rather it is to point out that there can be a perception gap in that stated ambitions on the one side are subject to radical overhaul over time. Simultaneously, expectations on the other side, whether from governments, communities in which investments have been made or the NGOs with their anti-development agendas, can end up being unrealistic, myopic or hostile.

Therefore, an ambitious announcement by a SWF or foreign government designed to allay domestic fears or insecurities is taken at face value by the other key parties outlined above. The reality is that the noise associated with SWF land acquisition has been considerably louder than the actual investment programmes themselves.

That said we are well aware of the risks in making such a sweeping statement. It could be the case that the corresponding noise, which erupts when the words “land grab” are mentioned is valid. It could point to some subterfuge on the part of foreign governments and the SWFs. In other words, are governments, SWFs and other agents of the state engaged in “land grabs” but negotiated agreements have been conducted and concluded in secretive environments.

Chinese investment is something of a conundrum. Much is made of it but it appears to be at the margins. The conundrum is twofold: first, Chinese investment in Africa has been vast in recent years but the investment has focused on the extractive industries and various ancillary industries. Second, despite the obvious demand needs, Chinese land deals are a lot less obvious than we might otherwise assume. For all the talk of land grabs, evidence is difficult to establish.

Take for example the alleged Chinese investments in African palm oil conducted, it is said, through various state-influenced companies. China’s ever increasing demand for palm oil coupled with the supply constraints beginning to emerge in Malaysia and Indonesia, suggest this is a sensible investment option. However, these alleged investments are even more secretive than others and it is difficult to determine accurately what the transactions genuinely entail.

Consider, for instance, Chinese agricultural investment in the DRC. Media reports since 2007 have recorded ZTE Agribusiness’s concession to cultivate palm on an area ranging between 100,000 ha to a somewhat larger 3m ha of land. However, by most accounts, there has been little progress on the ground. And such hyperbole is not restricted to land alone – apparently. Another common refrain is that China will send 1mn farmers to settle in Africa. Thankfully, the 1mn number has remained unchanged for many years now.

And what is true for the Chinese is most likely true for the others, too. Many of the possible transactions that feature in press reports are most likely based on idle speculation. Unfortunately, we have no reliable way to know for sure. However, even if we assumed that all these transactions are genuine, the total land under cultivation is no more than a tiny fraction of the 400mn ha of suitable land in the Guinea Savannah region, of which only 10% is currently cropped.

What we can say, however, is that an opaque transaction conducted in secrecy does not provide an answer to the question of how much emerging market food needs are going to change in the years ahead. It is quite one thing to acquire a batch of land secretly in the DRC; it is quite another to find an additional long-term supply need of over 100mnt of grains and oilseeds and cloak the lease arrangements in secrecy.

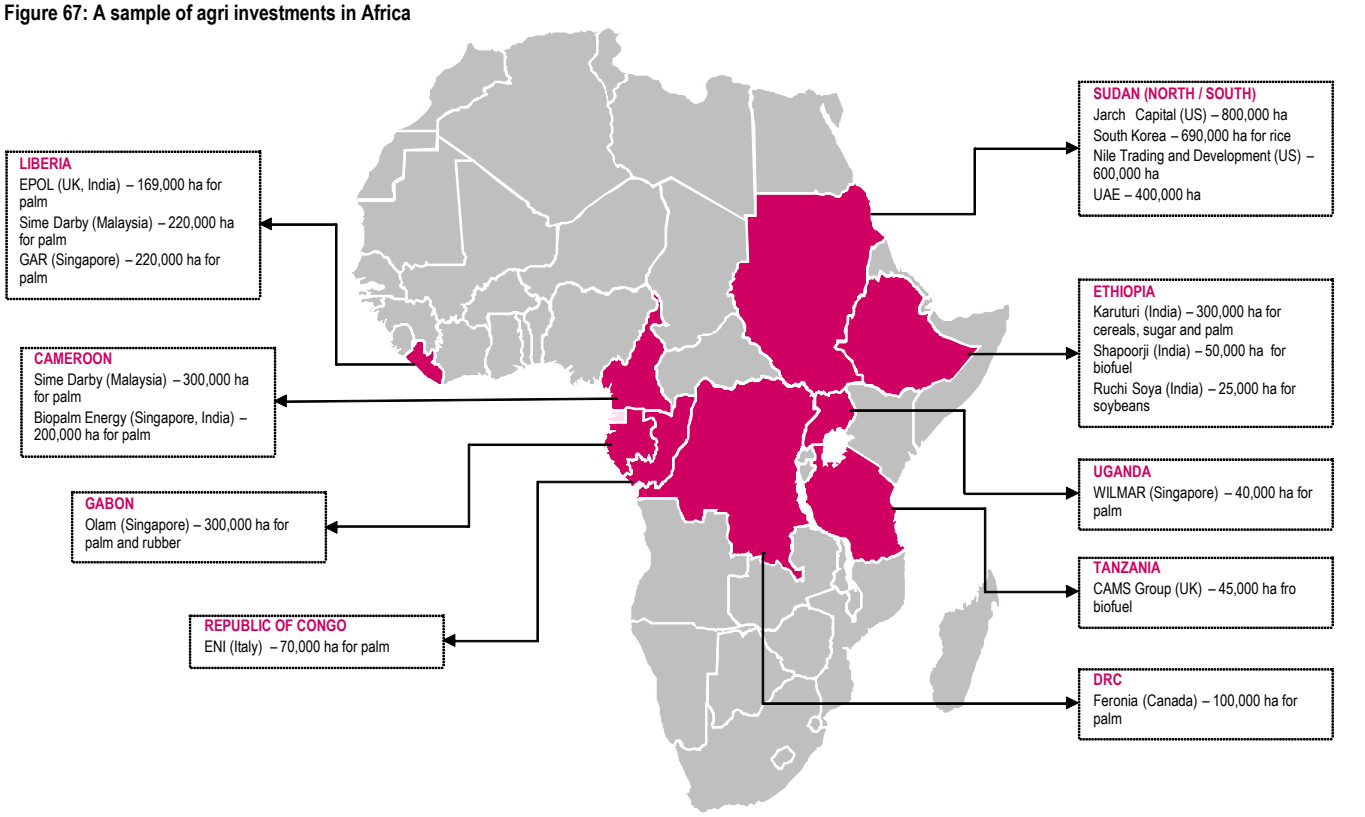
However, more important than understanding the nature of these transactions, we need to recognise that motives and needs are shifting and somewhat dramatically. China's unrelenting demand for grains and oilseeds is well documented throughout this report. Meanwhile the Arab Spring has had a galvanising impact on various governments and their SWF offshoots. Thus we may be on the cusp of a major change not just in sentiment but also in levels of investment.

A more obvious market participant is the involvement of the SE Asian palm oil producers in Africa. The involvement of companies, such as Sime Darby, Wilmar, Olam and Golden Agri-Resources, in the African palm oil sector is an indication of several themes: 1) rising demand for palm oil in China and India, 2) supply constraints emerging in Indonesia and Malaysia, 3) a need to develop equatorial belts in Africa and Latin America to fulfil these imbalances.

Unlike the Chinese and Middle-eastern companies, investment from India is almost exclusively through private companies. Government support is in the form of bilateral investment promotion and protection agreements (for example, with Ethiopia), simpler regulations on outward FDI and soft loans. Through the SIVA group, Indian interests in palm oil stretch cross the DRC, Liberia, Sierra Leone and Cote D'voire.

Figure 67 provides a graphical representation of several major deals that have been concluded or are under negotiation in Africa. Given the secrecy around such large deals, a few caveats are in order – true ownership of the project may be masked; the land area mentioned is the maximum area that is planned to be cultivated over the long-term; land may be bought or leased and some of these projects may not materialise. Moreover, it is important to note that, besides these large-scale investment proposals, there are a large number of deals that involve land areas under 25,000 ha, both in the countries highlighted below and in other countries such as Mali, Sierra Leone, Tanzania and Kenya.

Figure 67: A sample of agri investments in Africa



Source: Renaissance Capital

Brazil in Africa

Brazil's involvement in African agriculture is quite different from that of the others. Although Brazil has a range of leading corporate farming groups such as SLC Agricola, Brazilian involvement in Africa is driven primarily through EMBRAPA. The Brazilian government acknowledges that EMBRAPA's involvement on the Continent (and other emerging markets) is an extension of the country's foreign policy. Instead of working a land-based strategy, EMBRAPA works alongside existing development initiatives in Africa and provides technical expertise and assistance.

Its stated vision is "to make Brazilian agricultural technologies available to African countries and to promote its use for the benefit of all African agricultural sectors". EMBRAPA Africa's chief aim is to share scientific and technological know-how to improve food security and promote social and economic development across Africa.

What makes EMPRAPA unique is its focus on value-added services, specialist skills and intellectual property rather than land. This mirrors the experience of the organisation in developing the country's hinterlands from the 1970s onwards (i.e. private players invested in the land while EMBRAPA focused on the technological aspects of development). Specifically, EMBRAPA plans to transfer Brazilian agricultural technologies tested and adapted to the conditions of each African country. A few of the areas that are covered include agro-energy, tropical fruit production, vegetables production and processing, post-harvest technologies and animal husbandry.

A major reason why EMBRAPA can pursue such a strategy is the agricultural similarities between Brazil and Africa, specifically Sub-Saharan Africa. Given that both regions lie across similar latitudes, they enjoy similar biomes. There are semi-arid regions, humid forests and savannas in both Brazil and Africa. Moreover, they also have other similarities relevant for agriculture, such as similar distribution of soil types and similar phosphorous retention potential.

Figure 68: Agricultural similarities between Africa and Brazil

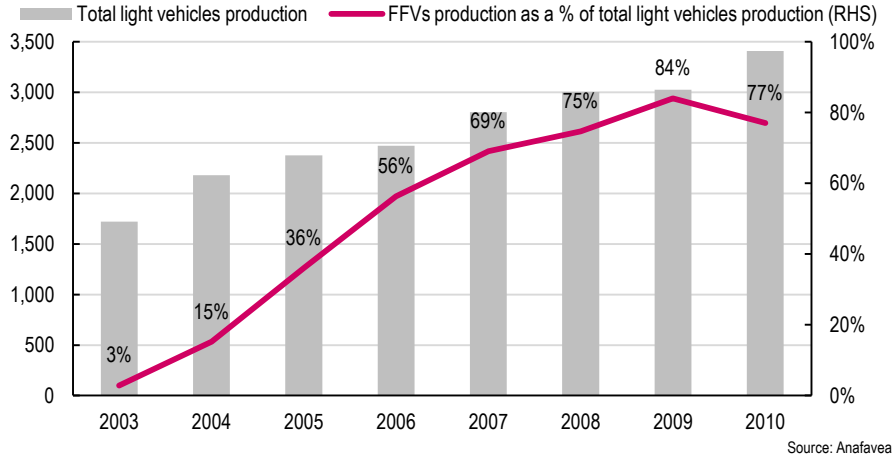
- Similar biomes – both have semi-arid regions, humid forests and savannas
- Composition of soil types are similar
- Distribution of major land resource stresses is similar
- Other similarities include phosphorous retention potential and soil moisture regimes
- The development of the Cerrado from the 1970s will likely mirror the development of the Guinea Savannah in the next 20 years

Source: EMBRAPA

While sharing similar agro-ecological zones is a useful attribute, what further enhances Brazil's credentials, is its success story in the Cerrado region. As we outlined in an earlier chapter, the Cerrado was transformed from a relatively backward agricultural region to a leading producer and exporter within a few decades. In short, EMBRAPA's leading role in the Cerrado's evolution is highly relevant and applicable to Africa, especially in the Guinea Savannah region.

Another success story that sets Brazil apart is its sugarcane-based ethanol industry. In response to the 1973 oil crisis – and coincidentally the year in which EMBRAPA was founded – Brazil embarked on an ambitious plan to replace gasoline with ethanol. Under the Pró-Álcool programme (Programa Nacional do Álcool), Brazil's national ethanol programme launched in 1975, sugarcane cultivation was expanded and incentives provided to increase the use of ethanol as fuel. A good measure of the success of this initiative is the market for flex-fuel vehicles (FFVs), which can run on any blend of gasoline and ethanol. Introduced in 2003, these vehicles accounted for about 77% of all new light vehicles production in 2010.

Figure 69: Total light vehicles production ('000) and FFVs production as a % of total light vehicles production



Source: Anafavea

We noted earlier that the global market for biofuels is widely expected to witness rapid growth in the years ahead. The agro-ecological conditions across vast areas of Africa are ideally suited to grow energy crops such as sugarcane. Brazil's expertise in this area is a major selling point for EMBRAPA's services in Africa.

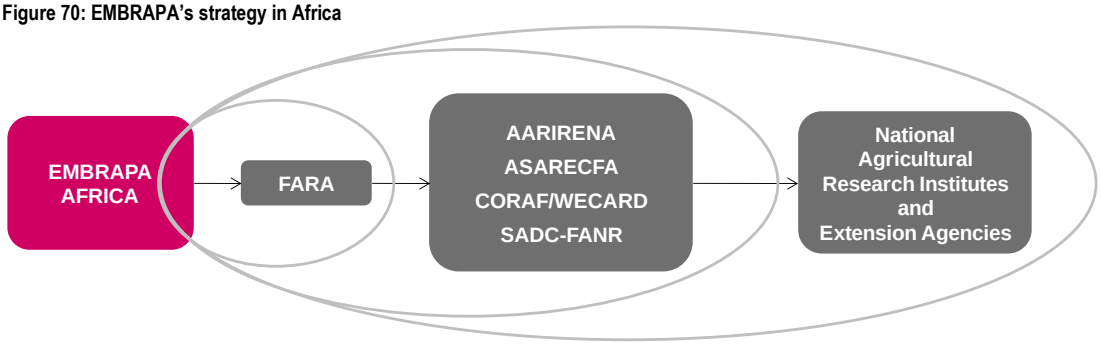
To transfer its know-how, EMBRAPA operates through bilateral and multilateral agreements. Rather than act independently, EMBRAPA aligns itself with existing development initiatives in Africa. For instance, the Comprehensive Africa Agriculture Development Programme (CAADP), a part of the African Union's New Partnership for Africa's Development (NEPAD) programme has identified four pillars for African development – land and water management; market access; food supply and hunger; agricultural research. EMBRAPA contributes to the first three pillars, and partners with Forum for Agricultural Research in Africa (FARA) to the fourth pillar.

Other organisations that EMBRAPA works with are:

- SADC-FANR – Southern African Development Community - Food, Agriculture and Natural Resources
- CORAF/WECARD – West and Central African Council for Agricultural Research and Development
- ASARECA – Association for Strengthening Agricultural Research in Eastern and Central Africa
- AARIRENA – Association of Agricultural Research Institutions in the Near East and North Africa
- EAC – East African Community
- SADC – Southern Economic Development Community
- ECOWAS – Economic Community of West African States
- ADB – African Development Bank

- Foundations such as The Bill and Melinda Gates Foundation
- AGRA – Alliance for a Green Revolution in Africa

Figure 70: EMBRAPA's strategy in Africa



Source: EMBRAPA

EMBRAPA's contribution is primarily technologies and human resources, while financial support comes from governments, development agencies or donors. The usual mode of EMBRAPA's operations is to gauge the country's requirements and identify which of its current capabilities would be useful. It then facilitates financial resources, and implements the project jointly with other stakeholders.

Figure 71: EMBRAPA's activities

PRODUCTS		SERVICES	
• Agricultural machinery	• GMOs	• Business incubation	• Information networks
• Animal clones	• Hybrids	• Consultancy	• Quality control
• Bioinsecticides	• Kits for diagnostics	• Franchising	• Quarantine analysis
• Equipments	• Vaccines	• Germplasm exchange	• Training
• Germplasm	• Varieties		

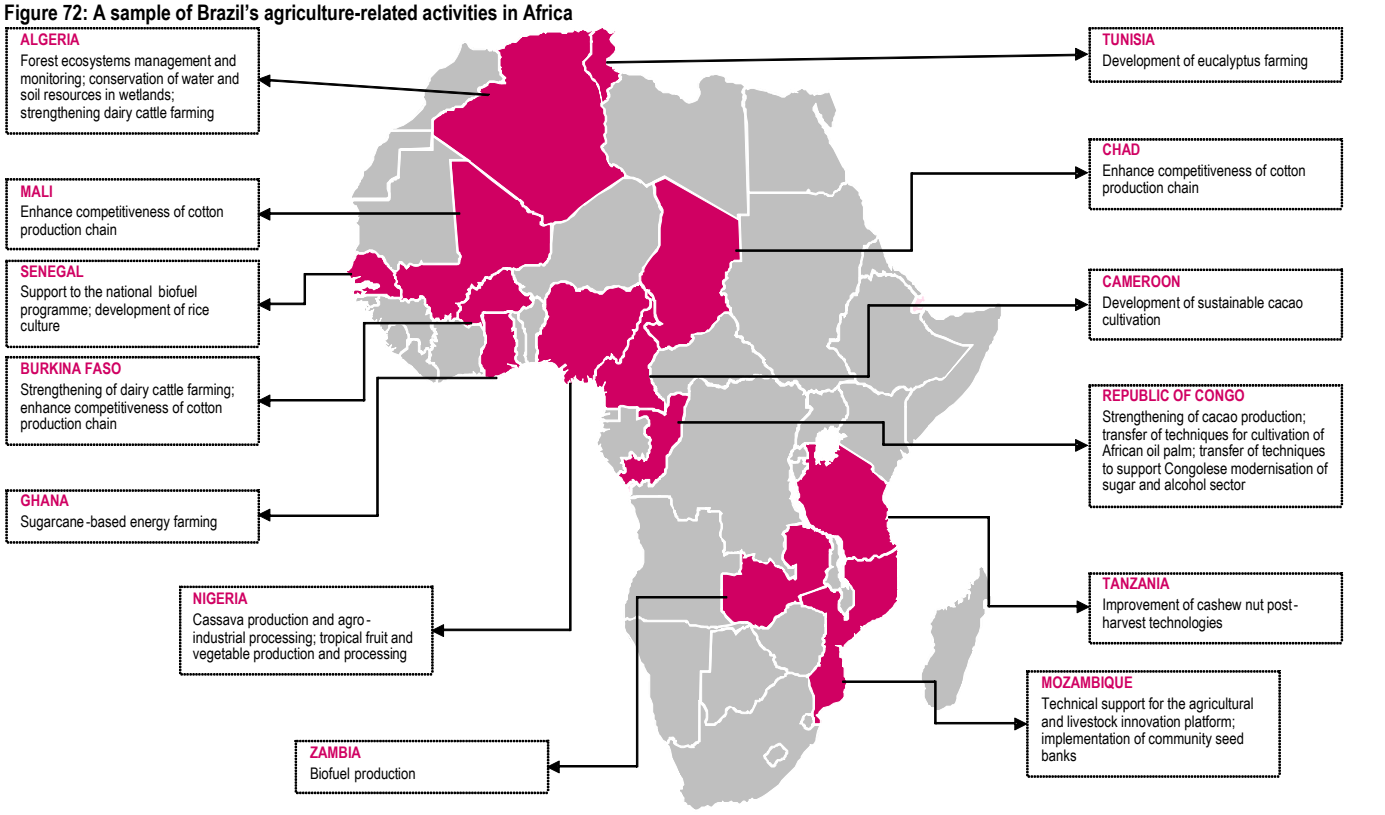
INFORMATION		PROCESSES	
• Biological security networks	• Monitoring – environmental Quality	• Agro-ecological zoning	• Gene prospection methodology
• Cultivar evaluation networks	• Monitoring – food chains	• Crop adaptation processes	• Integrated pest management
• Forecasting and future analysis	• Monitoring – IPM	• Crop management systems	• Plant & animal transformation
• Genomics and biological functions	• System´s automation	• Fingerprinting	• Traceability & certification
• GMOs & bio-safety	• Traceability and certification	• Food processing methodology	

Source: EMBRAPA

Figure 72 shows the extent of Brazilian involvement in Africa, specifically with regard to agriculture-related activities. This is not a comprehensive list and there are Brazilian projects in many more African countries. EMBRAPA is driving most of

these, with the rest handled by other specialised research organisations, such as the Executive Commission of the Cacao Cultivation Plan (CEPLAC).

Figure 72: A sample of Brazil's agriculture-related activities in Africa



Source: EMBRAPA

Outside the usual factors that affect investment in every African business sector, (e.g., corruption, the absence of a rule of law, weak property rights and so on) there are a number of factors, which add to the challenges for the African agriculture sector. These are:

- The lack of a co-ordinated approach between public and private-sector interests
- The inability of private-sector market investors to develop an integrated approach across the value chain
- A lack of equilibrium in the competing interests of the private and public sectors
- The lack of either concentrated funding or a consistent supply of funding for long-term projects

Why African agricultural projects fail

Let's look at some of these issues. Consider that a defining characteristic of the African agricultural landscape is the fragmented nature of both the investment opportunities and the investor base. Thus, one excellent investment prospect can struggle to raise $500,000 while another investment with considerably weaker prospects can raise $25mn with relative ease.

The reason for the failure of many African projects is two-fold: over-ambition and the lack of an integrated approach to the investment. Over-ambition is obvious: we can pick out a dozen projects that have stalled because the original plans to develop several hundred thousand hectares of land ran out of money, experts in palm oil find out that triple-cropping of oilseeds and grains is outside their sphere of expertise, money is dissipated in the multiple unforeseen events which the original business plan had not forecasted, etc. Aggregating land is easy – everything else is difficult.

The lack of an integrated approach to investment is less obvious. Even in environments like Ukraine, Russia and Argentina where large-scale farming has a long history an elementary infrastructure existed that allowed the agriculture sector to flourish. Ports, silos and the associated infrastructure that allows an industrial agriculture system to exist may not have been brilliant under the communist or only slightly less ruinous Peronist system of government, but they did exist.

Fast forward to Africa: we have already noted how much investor focus is on the availability of a single resource (i.e., land mostly) and questions surrounding all the other essential constituent parts of an industrial farming apparatus are ignored. In short, parties invest in a land bank and, within the early periods of the project, they begin to understand that the lack of a road, elevator facilities, a skilled labour pool which understands how to harvest, conveniently positioned processing facilities and so on, are all likely to contribute to the failure of the project. Put it another way: the soils in some country might be outstanding for agriculture but if you don't have a paved road and the nearest place you can purchase a bag of fertiliser is 200 km away, then the land isn't worth a cent. Throw in a whole range of social factors, and many African projects, as they stand, will struggle.

Thus the lack of an integrated approach is one of the principal bottlenecks to investment in the African agricultural system. There are plenty of governments, which recognise this fact but recognition of the fact alone cannot eliminate it. Thus the generosity of some governments in terms of the assets and infrastructure they will put into a project becomes pointless. For example, a group of elevators given to an investor free of charge becomes almost meaningless if you don't have anything to put in those elevators.

Broadly speaking, we make a few observations:

- A land-based strategy no matter how cheap, how long the leases, how many out-growers are involved, how big the area offered, is likely to fail in the absence of other necessary conditions. If land was all that mattered, African agriculture would be flourishing already.

- The pool of skilled labour – managerial and operational – is lacking in all parts of Africa. Large-scale ventures might have a readily available pool of

cheap labour at their disposal. Critically, agriculture is the one business sector which actually lacks critical mass in “middle management”.

- Governments are desperate to find potential investors to alleviate their food deficits, slow down the irreversible shift from rural areas to urban centres, provide employment opportunities in processing activities and so on.

- Commercial growth in the agriculture sector is surprisingly dependent upon non-agricultural growth opportunities. Thus the presence of a mining infrastructure and its associated benefits can be a major help to the agriculture sector.

- Too few investment opportunities begin at one end of the value chain and set out a strategy to build a consumer brand at the other end. GADCO in Ghana is a good example of a company attempting to build an entire value chain, from farm to consumer brand.

What this suggests is that there are a number of intellectual conundrums, which need to be taken into account; a geostrategic need for industrial quantities of food on the one hand and a grossly undercapitalised localised sector on the other. We are aware of several institutions that have expressed a wish to invest large quantities in African agriculture but which struggle to find the correct vehicle in which to invest.

We see a number of problems here. First, the operational risks of establishing an agricultural supply chain are so complex that large sums of capital can swiftly become small sums of capital. Only four years ago, three of the authors were involved in an agriculture listing, which saw $350mn of capital raised in an IPO dissipate to $60mn over that period. And this was a straightforward agriculture company with few of the complexities of a value chain to worry about and also working in a region with a reasonably functioning infrastructure.

A second problem is the wariness of some organisations in taking large sums of cash from investors and applying it to agriculture projects. Unbelievable as this may sound, their reasons were sound and can be summarised by three over-riding features: 1) an understanding of the previous point – that agriculture can become a big, black hole for capital, 2) the need to keep expectations in check – again related to the previous point, and 3) the political difficulties in arranging offtake agreements with overseas organisations in areas where periodic food shortages are the norm.

Third, how does one address the crisis of middle management? When we say middle management, we are identifying what we see as a key bottleneck across the sector. The nature of strategic programmes as initiated by the likes of the SWFs, the Gates Foundation, AGRA, assorted development agencies, national governments and so on might involve millions of hectares of land and grand development schemes. At the other end of the spectrum is a readily available pool of cheap labour. Yet, in the middle there is a significant lack of skilled labour that can manage 200-1,000 ha projects i.e., the approximate size of operation where proper industrial agriculture begins and smallholding/labour-intensive farming ends.

In short, agriculture is one of the few industries in the world where there is a dearth of middle managers. In effect, what we are asserting here is that one of the principal bottlenecks lies in the lack of a talent pool, which can take on large-scale projects

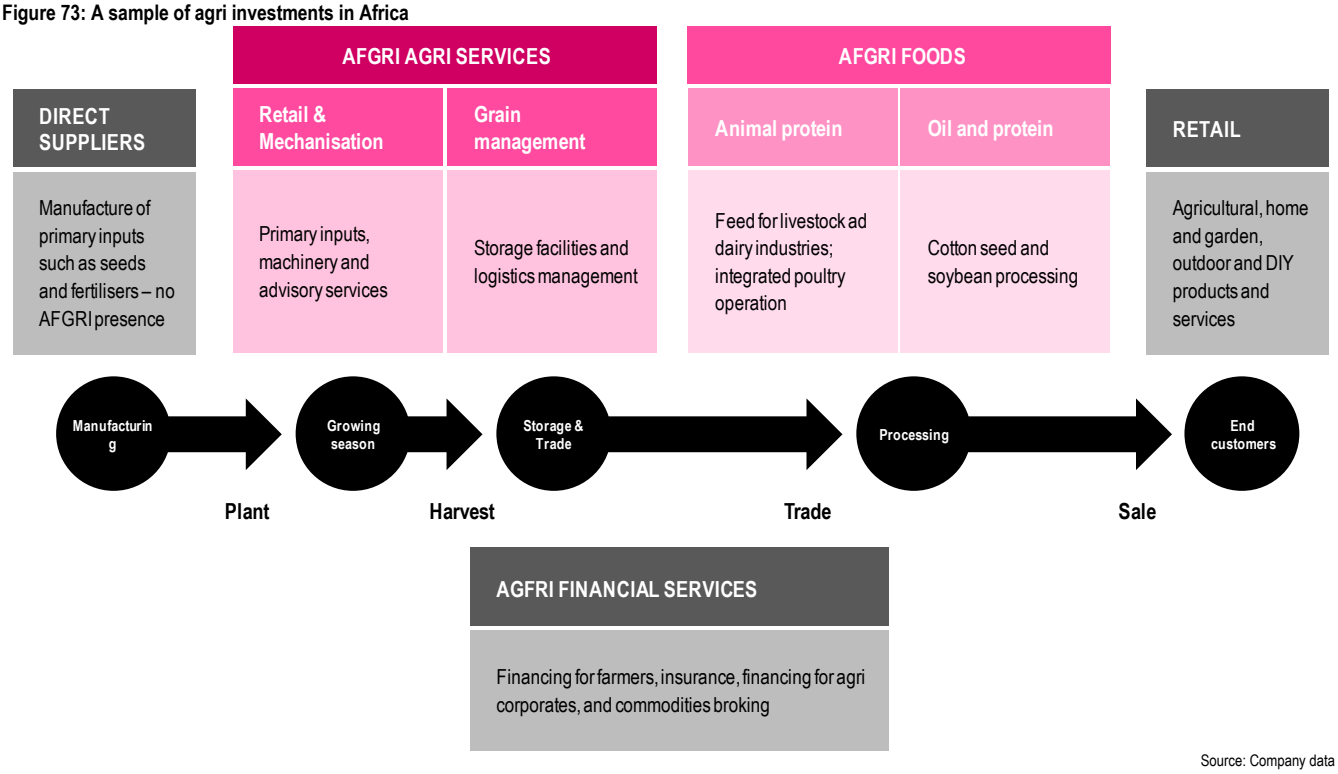
and execute them successfully. The only organisations with the talent pools, logistics expertise and financing skills capable of addressing these issues are not to be found in Brazil or in the developed world. Instead, they are to be found in South Africa.

South Africa is a repository of expertise, intellectual property and know-how that is unrivalled across the continent. While the country might lack an EMBRAPA or large-scale industrial farming groups, it does also possess an unparalleled knowledge of African agriculture, first-rate agricultural skills and an expertise that spans the entire agricultural value chain. Many of those skills are to be found in the country's trade associations, which have been transformed into broad-based agriculture businesses with excellent knowledge of logistics, financing and input supply. Half a dozen of them matter and here we profile two of the most advanced: AFGRI and Senwes.

AFGRI

AFGRI can trace its roots to a cooperative set up in the early part of the last century, Today the business, listed on the Johannesburg Stock Exchange, is involved in a wide of activities along the agricultural value chain. The main activities include an agricultural supplies business and financial services. In addition, the company produces animal feeds, poultry and oils. Figure 73 summarises the range of AFGRI's activities.

Figure 73: A sample of agri investments in Africa



Source: Company data

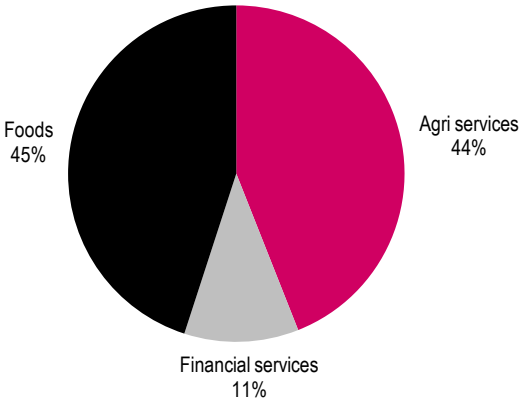
AFGRI's agricultural services include the sale of equipment such as tractors and the sale of agricultural inputs. AFGRI is the largest single John Deere franchise in

Africa. The company is also a major provider in the grain handling and storage business. AFGRI has a total storage capacity of more than 4.3mnt spread across 65 silos and nine bunkers in South Africa and Zambia.

In the foods and processing sectors, AFGRI's activities include oil processing and extraction, animal feeds and poultry products. AFGRI is a large oilseed processer with the capacity to process 80,000 tonnes of soybeans, 30,000 tonnes of cottonseed and 80,000 tonnes of sunflower seed. The company is also a leading animal feed producer in South Africa, with an annual capacity of over 1mnt, supplying poultry, dairy, beef, sheep, game and pet food markets. In addition, AFGRI's poultry division is an integrated operation and processes over a million birds a week.

AFGRI's financial services include commodity broking, foreign exchange management, lending and insurance. Figure 74 shows the contribution from the three segments to AFGRI's pre-tax profit in 2011.

Figure 74: Segmental split of AFGRI's profit before tax, 2011



Source: Company data

Senwes

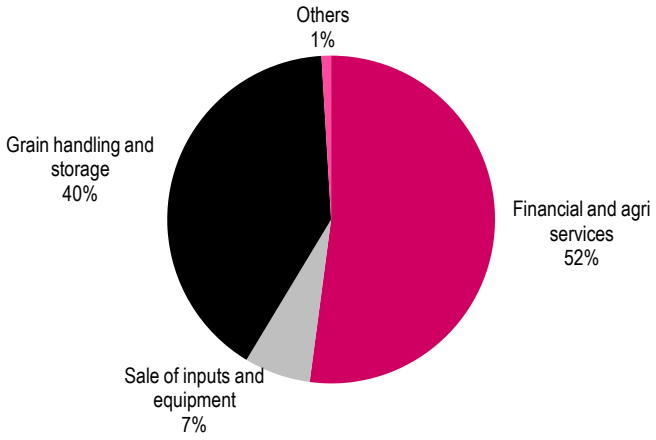
Similar to AFGRI, Senwes traces its roots to a century-old co-operative business in South Africa. Senwes's activities include supplying production inputs, sale of farm equipment, grain handling and storage, specialised agricultural services, and financial services.

Senwes's grain handling division has over 70 silos and bunkers with a total storage capacity of 4.8mnt. The company's agricultural service offerings include agro-economic studies, evaluation of agricultural technology, animal stock management programmes, soil analysis and mapping and so on. Senwes's financial services division offers financial products to farmers and grain off-takers.

In 2011, Senwes and Bunge, the US-based agricultural trading and food processing group, formed a joint venture, which was 51% owned by Bunge and 49% owned by Senwes. The joint venture is expected to focus on business development across the SADC region.

The segmental break-up of Senwes's profit is set out in Figure 75.

Figure 75: Segmental split of Senwes's profit, 2011



Source: Company data

Creating conduits for capital

As noted, the lack of a functioning infrastructure on one side coupled with the lack of an integrated approach to investments on the other, means corporations that provide something approaching an integrated value chain *and* have deep knowledge of farming in difficult African environments are likely to have a natural advantage over competing organisations.

They are, however, unlikely to be the only players in the market. Moreover, their position requires strategic drive and carries significant execution risk. As agricultural enterprises, they undoubtedly understand these risks better than most and their organisational structures are almost tailor-made to carry out this process. As we also noted earlier, a key difficulty, which has long been a conundrum for the agriculture sector, has been its undercapitalisation and lack of industrial weight. It remains at heart an industry dominated by corner shops. In an urbanising landscape that structure will change significantly over the next two-to-three decades.

Nevertheless, the needs of investors usually shape the investment vehicles themselves. The fact is that African agriculture is likely to require considerable amounts of investment if its potential is to be realised. That suggests to us that IPOs or private-equity fundraisings in the range of $30-100m may be necessary stages for the development of the sector in the years ahead, but will prove insufficient in addressing the scale of the opportunity.

One model we might see adapted to the specific needs of African agriculture is the Chinese asset injection theme, which gained prominence in the mid-to-late 1990s. It is worth highlighting how this model addressed a particularly acute bottleneck for funding between China and Hong Kong.

After the experiments of the Shanghai and Shenzhen B-share markets, which permitted foreigners to invest in Chinese equities, Chinese SOEs began to list in Hong Kong. These so-called H-shares became increasingly prominent and soon many of China’s large-scale industrial enterprises in the oil, banking and telecoms sectors followed.

However, few of these IPOs were straightforward listings. Instead, unlisted and state-owned parent companies based in China listed some of the assets in Hong Kong and eventually began to inject other parts of the group into the listed entity. Thus China Mobile began life as two listed provincial wireless networks in Hong Kong and eventually consisted of operations in all 31 Chinese provinces and municipalities within three-to-four years and several rounds of asset injections. Major users of this model were the municipal authorities themselves – the most notable being Beijing Enterprises and Shanghai Industrial, which would acquire listed shells in Hong Kong for this purpose and then inject illiquid local assets (e.g. property portfolios) into these listed shells.

The key point for the SOE or province/municipality was to inject the assets into the listed vehicle at an attractive discount to ensure investor interest while simultaneously owning a majority of the stock, which benefitted from the investor interest. Thus a virtuous circle was created and the model, when it worked properly, was a great success in promoting investment into Mainland entities. It should be added that the scheme could be subject to speculative abuse and did have obvious conflicts of interest.

You might well ask how this is applicable to African agriculture. As we've outlined in this chapter and others, the need for enormous sums of capital to develop the agriculture sector is at odds with the relative illiquidity of the vehicles as they stand. Moreover, national governments are desperate to develop their own domestic agribusiness industries. Finally, the need for an integrated approach to investment, as we said previously, is essential to a successful investment.

The answer to these conundrums and conflicts could be to list national development projects. Not only could they be liquid investment vehicles, they could be diversified not just in terms of vertical integration but also in terms of crops. After all, a lack of crop correlation is something of an agricultural holy grail, has still not been achieved by most agribusinesses and is likely to materialise either in Africa or Brazil. Above all, government could take a sizeable stake to ensure that the interests of taxpayers are aligned with those of investors. They could also promote the development of local capital markets.

Another investment shift we might witness in the years ahead is the emergence of local food processing/consumer companies investing in agriculture across the Continent. Consider that the agricultural investment success stories in Eastern Europe and the CIS are, more often than not, the integrated agriculture groups such as RusAgro, Cherkizovo, MHP, Kernel and Astarta. A decade ago most of these companies focused on food processing and consumer branding and did not have interests in primary production. Now, most of them are among the biggest farmers in Russia or Ukraine. A major investment attraction of these integrated enterprises is not so much the fact that they "secure" supply; instead it is the fact that they control a large part of the value chain and also have an internal natural hedge against swings in soft commodity prices. In many cases, food-processing groups are relatively liquid investments compared to the pure primary producers.

Whether or not these integrated enterprises remain as long-term business models remains to be seen. Much of that will depend on whether the risk reduction that comes from geographic expansion is lower than the risk reduction that comes from controlling a value chain. What we are suggesting here is that a liquid investment in volatile primary production but with assets across, say, three continents is a more

desirable investment than one where the company controls the value chain and has an internal hedge. Given that industrial agriculture is at the earliest stage of development, it is too early to say what will appeal more to investors over the long term.

What we can say though is that given the scale of the opportunity and the relative ease with which food-processing groups can raise capital, it might be the case that many emerging African consumer brands begin to invest in primary production. It happened in Brazil, it took place in Russia and Ukraine – something broadly similar might take place in Africa in the years ahead. Most likely it will emerge as an intermediate model in our view, but equally, it could endure for many years.

So, where are we now? At a halfway house it would appear. Seventeen years ago, one of the authors was closely involved in the listing of a B-share Chinese state-owned business called Shanghai Industrial Sewing Machine. It was the single stock we can recall among the six B-shares we listed in a six-month period at the end of 1993 and the beginning of 1994. At the time it was considered real pioneering stuff. And yet, within a few years Shanghai Industrial Sewing Machine disappeared from any investor radar screen that it might have been on. We are, however, much more familiar with names like China Mobile, CNOOC, Sinopec and Bank of China, all of which represented a much more advanced notion of Chinese capital markets.

Therefore, in terms of African agriculture (and perhaps Africa as a whole), we could be at a similar stage to where China was in 1993 in terms of creating conduits of capital for listed enterprises. We have private-equity investments, we have hedge fund investments, we have a multitude of small, slightly illiquid, pioneering listed enterprises and on the sidelines we have SWFs, national governments, aid agencies with commercial ambitions and deep commitments to change Africa. Then there are the food-processing groups, the old South African trading businesses and the vehicles, which we have only begun to consider. This is a world of infinite possibility and possibly infinite outcomes. Welcome to Africa – this other Eden.

The companies

Consumer & Retail
Zambia

Initiation of coverage
Equity Research
21 November 2011

Renaissance Capital

Zambeef

Not just a Zambian story

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- **Zambeef is one of the largest food producers in Zambia,** a country with significant potential for food production thanks to its large and highly productive undeveloped arable land and large water resources. Zambeef owns the largest irrigated row-cropping farms in the country and is integrated from grain production to food processing, distribution and retail, with large market shares in meat, oil and dairy.
- **The acquisition of Mpongwe farms** will increase the cereals output of the Group to 131.4kt by FY13, from an average of 47.5kt over FY07-10. A lack of soya and volatility in other crops has been a key issue for Zambeef's oil (Zamanita) and feedstock production. We believe an increase in the Group's harvest will substantially improve volume growth potential and the profitability of these segments, and should also benefit meat and dairy production.
- **We believe Zambeef can replicate its model in Nigeria and Ghana,** where it partners with Shoprite in the distribution of meat products, and has the option to expand this partnership to establish a range comparable with its activities in Zambia. Shoprite's recently reasserted commitment to grow in Nigeria suggests strong growth for Zambeef.
- **Strong growth.** We expect revenue and EBITDA to rise at respective CAGRs of 17% and 57% over FY10-13, on the back of strong volume growth in Zambia and West Africa. We regard our forecasts as conservative, however, and we see many areas for potential positive surprises on revenues and margins.
- **We initiate coverage with a TP of ZMK4,289 (GBP0.536) and BUY on the Zambian listing (ZAMB.LZ) and a HOLD on the London listing (ZAM LN).** Based on a DCF and multiples-based valuation (EV/EBITDA), our fair value range is ZMK4,233-4,345 per share, vs a current share price of ZMK3,000 in Lusaka and ZMK4,000 in London (GBP0.50) (as of 16 November). Based on our estimates and the share price in Lusaka, Zambeef trades at respective P/E and EV/EBITDA multiples of 5.9x and 4.4x for 2012E, putting it at a discount to 51% for P/E and 28% for EV/EBITDA on our estimates. The share price in London implies 2012E multiples of 7.8x P/E and 6.0x EV/EBITDA – a discount of 35% based on P/E and 2% based on EV/EBITDA.

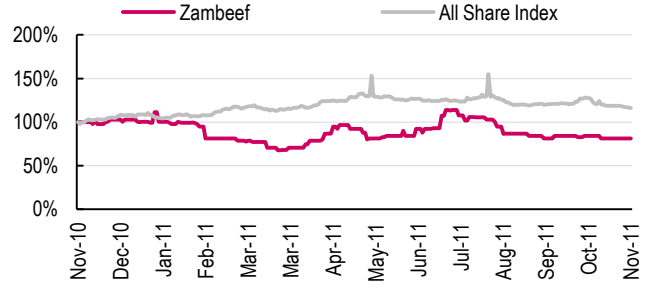
Report date:	**21 November 2011**
Rating common, LuSE	**BUY**
Rating common, AIM	**HOLD**
Target price (comm), LuSE, ZMK	4,289
Target price (pref), na	na
Current price (comm), LuSE, ZMK	3,000
Current price (comm), AIM, GBP	0.50
Current price (pref), na	na
MktCap, ZMKmn	797,655
EV, ZMKmn	1,015,699
Reuters	ZAMB.LZ
Bloomberg	ZAMBEEF.ZL
ADRs/GDRs since	na
ADRs/GDRs per common share	na
Common shares outstanding, LuSE, mn	194.3
Common shares outstanding, AIM, mn	53.7
Change from 52-week high:	-28.6%
Date of 52-week high:	15/07/2011
Change from 52-week low:	20.0%
Date of 52-week low:	22/3/2011
Web:	www.zambeefplc.com
Major shareholder with shareholding	Standard Chartered Nominees 47%
Share price performance over the last	1 month -3.2% 3 months -20.8% 12 months -18.7%

Summary valuation and financials, $mn

	Revenue	EBITDA	Net income	EPS, $	DPS, $	EBITDA margin	EV	Net debt	EV/Sales, x	EV/CF, x	EV/ EBITDA, x	P/E, x	P/B, x	Div yield, %	RoAE
2010	797,060	71,087	22,498	140	54	8.9	1,035,406	220,562	1.30	18.46	14.53	21.43	1.03	1.8	4.6
2011E	920,536	121,615	64,626	261	91	13.2	1,029,165	214,320	1.12	105.34	8.49	11.51	0.97	3.0	9.9
2012E	1,097,250	206,478	128,001	516	181	18.8	964,090	149,246	0.94	8.54	5.00	5.81	0.87	6.0	15.8
2013E	1,271,479	248,024	155,519	627	220	19.5	864,493	49,648	0.81	6.23	4.16	4.78	0.78	7.3	17.2

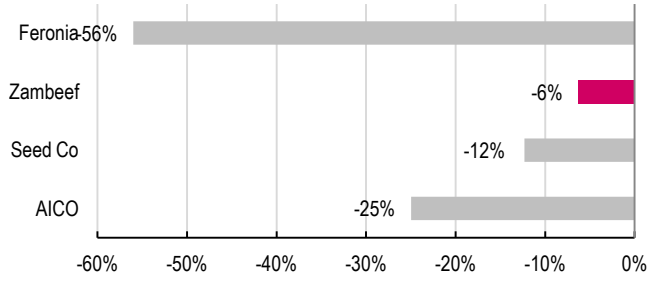
Source: Company data, Renaissance Capital estimates

Figure 76: Price performance on LuSE – 52 weeks



Source: Lusaka Stock Exchange

Figure 77: Sector stock performance – 3 months



Source: LuSE, Bloomberg

Investment summary

Strong growth potential in Zambia and West Africa

We think Zambeef is well placed to benefit from rising food demand in Zambia and West Africa. Its integrated model, from cereals to meat production and distribution and retail through various outlets (its own, in partnership with Shoprite and wholesale), has helped the Group to grow rapidly in Zambia and build strong positions in meat, oil and dairy. We expect growth of 12% and 11% in GDP per capita in 2011 and 2012, respectively. Consumption of meat and dairy products is low in Zambia and we expect growth in disposable income to drive strong growth in food demand.

Zambeef's acquisition of farms in the Copperbelt (Mpongwe), if completed, should boost the Group's cereals intake, and should improve volume growth and profitability in oil and feedstock production. These two segments previously lacked sufficient quantities of soya beans to operate optimally and meet market demand. We expect substantial improvements across both.

The cost of the acquisition (at $47mn) seems attractive to us, given the potential increase in cereals. Also, the price paid by Zambeef was substantially below an independent valuation of the farms by Knight Frank, which came in at $59mn (December 2009).

Great potential in West Africa. Zambeef is partnering with Shoprite in Nigeria and Ghana to replicate its Zambian model, and we believe West Africa offers even more potential for Zambeef than Zambia, owing to its much larger and fast-growing urban population. Having encountered logistics problems in sourcing quality meat in Nigeria for a number of years, Zambeef has set up its own farm close to Lagos (in Ogun state, under a long-term lease), which should enable it to supply much greater volumes with improved quality. We expect West African growth to accelerate in the coming years (a CAGR of 59% over FY10-13E).

We expect adjusted net profit to increase at a CAGR of 71% over FY10-13, on the back of strong volume growth in crops (a higher-margin business vs the Group average), and margin and volume improvements in oil and feedstock. The FY10 numbers are easy comparables to beat (despite a larger cultivated area), with cereal output down 46% YoY, to its lowest level since 2006. We regard our FY11-13 forecasts as cautious. Specifically:

- For crops: we assume lower yields than the historical levels of the existing business, and much lower gross margins than historical levels and management targets.
- We do not fully factor in the potential gains from new and greater animal feed production capacity at Novatek Animal Feeds (Novatek; a Zambeef Group division). The FY10 financials did not reflect the potential profitability of this asset.
- Food production: we forecast slight margin erosion in meat production, despite potential efficiency gains from increased output at Novatek.
- Zammilk has a promising outlook, in our view, and we think this segment could also surprise on the upside in terms of revenue growth and margins.

- West Africa: we factor in only half the potential revenue growth of Shoprite's expansion plans (this factors in the risk of delays to the expansion, owing to challenging logistics).

In addition to the potential upside from crops and food production in Zambia and West Africa, we cannot factor in the potential of:

- Further expansion in Zambia after Zambeef ramps up its current capacity in oil, feedstock and food production.
- The ramp-up of palm plantations which the company expects to start yielding in 2014.
- The opportunity of further expansion with Shoprite, notably in Zimbabwe, DRC, Tanzania and Uganda (no agreement has been signed yet). The potential African partnership with Shoprite is a unique opportunity, in our view, and only Zambeef has developed this type of partnership with Shoprite in several countries.

Valuation: Until early April, Zambeef traded at substantial discounts to SSA peers which we believe were unwarranted. The shares at end-March traded at ZMK2,505. Currently (16 November) the shares trade at ZMK3,000 in Lusaka and GBP0.50 in London (ZMK4,000). Also, the 56% increase in the number of shares post the rights issue and the placement of shares on AIM imply an increase of 101% in the weighted market capitalisation of Zambeef (based on the share prices in Lusaka – 78% of the shares trade in Lusaka – and London). Hence, the discounts to peers have reduced.

For our previous valuation we used 2011 multiples and forecasts for our peer valuation. We update our valuation using 2012 multiples and calendarised forecasts. We highlight that our 2012E numbers include substantial growth from the acquisition (EPS rising from ZMK125 in 2010 to ZMK186 in 2011 and ZMK485 in 2012). Based on the share price in Lusaka, the discount on 2012 calendarised multiples declined from 49% to a 28% using EV/EBITDA and 65% discount to 51% using P/E. The share price in London implies 2% discount to peers 2012 EV/EBITDA multiples and 35% discount on P/E. Zambeef benefits from large tax breaks and we expect its effective tax rate to range between 7% and 9% over 2011-13. Given the lower tax rate, we would expect Zambeef to trade at a discount to peers' P/Es. It is for this reason that we only use EV/EBITDA multiples in our peer valuation.

Our SSA food peers mostly include Nigerian food plays and Innscor Africa. Nigerian food plays have much higher returns (RoE and profit margins), less volatility in profitability, stronger balance sheet and relatively less exposure to agri-risks. We believe that Zambeef should trade at a discount to these peers.

We use a DCF- and multiples-based approach to value Zambeef's equity. Our valuation range comes in between ZMK4,233 (DCF) and ZMK4,345 per share (based on peers average 2012 calendarised EV/EBITDA). We base our target price in the middle of that range, at ZMK4,289, which implies 43% upside to the current share price of ZMK3,000 in Lusaka and 7% upside to the share price in London.

Our valuation includes the capital raising ($55mn) the cost of acquiring the Mpongwe farms ($47mn) and the capex which will be spent on Mpongwe this year

($5mn), as well as the growth and margin improvements to be driven by this acquisition. As noted elsewhere in this report, we think that if the integration or expansion of Mpongwe is delayed, Zambeef could miss its growth and margin-improvement targets. Any delay in Mpongwe would have a substantial impact on Zambeef's other segments and would have a significantly negative impact on valuation. However, we believe the risk of delays is relatively limited, as the farms will continue to be run by the same management and most of the area for irrigation expansion is already prepared.

Key risks:

- Volatility in the prices of commodities and agricultural inputs (fertilisers, feedstock). Even in the context of declining prices, Zambeef is negatively exposed. Its inputs have been hedged with up to 12-month contracts in the past, but it could not match this duration in hedging revenues (Zamanita made large losses on forward contracts in FY09 when commodity prices declined; the management team has since changed).

- Livestock diseases are relatively frequent in Zambia and have already negatively affected Zambeef's meat and dairy volumes and profitability in the past (as reported in the annual reports for FY09 – beef prices decline – and FY10 – the milking herd had to be culled due to a disease). Zambeef's agricultural production can be affected negatively by adverse weather conditions or crop diseases. If Zambeef's products are affected, it may affect its business.

- Slower expansion at Mpongwe: we make highly conservative assumptions about output from Zambeef farms, and use management guidance for Mpongwe. If the expansion of Mpongwe is delayed, output could miss management targets and the rest of Zambeef's operations could be affected negatively.

- Volatility in the kwacha: a large proportion of Zambeef's production inputs is still imported, and a large proportion of Zambeef's term debt is in dollars. Hence, large movements in the currency have previously had negative effects on Zambeef's results.

One of the largest Zambian agri-businesses

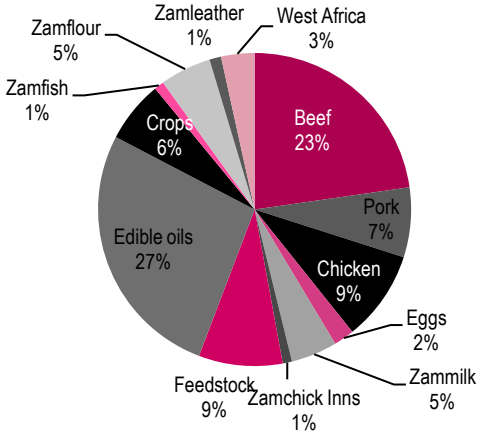
Zambeef is one of the largest agri-businesses in Zambia, and is integrated from the production of cereals to the distribution of meat and dairy products. Zambia offers strong potential for agriculture as it has large amounts of undeveloped arable land and vast water resources (42% of Africa's resources, according to Zambeef's FY10 annual report) with regular rains. Only 15% of its arable land is exploited (source: Knight Frank) and it is well-placed to support industrial farming. Zambian land offers very high yields on both rain-fed and irrigated plantations. Zambian agriculture also has two full growing seasons in a year.

Zambia has a population of 12mn, including a 4.2mn-strong urban population. We expect the Zambian economy to grow 6.9% and 6.1% in 2011 and 2012, respectively, on the back of strong growth in agricultural output (good rains), manufacturing and the mining sector. GDP/capita averages $1,270, and we expect it to grow 12% and 11% in 2011 and 2012, respectively.

Zambeef has operations all along the value chain in row cropping, edible oil, feedstock, beef, chicken, eggs, pigs and dairy production, retail distribution in stores and restaurants. Zambeef distributes its products partially through its own retail network and partially using other retailers in Zambia (including a concessionary agreement with Shoprite to run 20 butcheries in Zambia). We think the Group is very well placed to benefit from food-demand growth in Zambia and across the region.

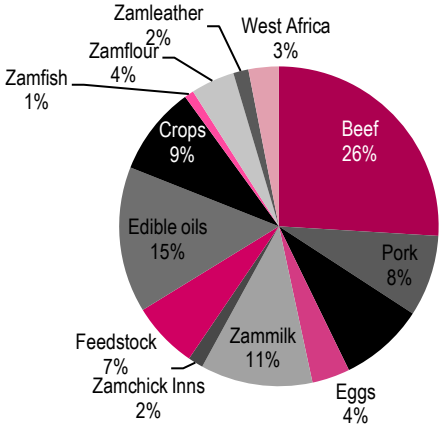
The Group also started operations in Nigeria and Ghana in 2005 and 2007, respectively, where it produces and processes meat and distributes most of this meat through Shoprite stores. Zambeef is set to benefit from Shoprite's expansion in Nigeria and Ghana as Shoprite's meat supplier, and we think it should take substantial market share in meat production in Nigeria and Ghana, and possibly do so with other products if it expands its product range as it has in Zambia. We see very significant potential for Zambeef to replicate its Zambian model in West Africa.

Figure 78: Zambeef FY10 revenue breakdown



Source: Company data

Figure 79: Zambeef FY10 gross profit breakdown



Source: Company data

The Group increased revenue at a CAGR of 25% over FY07-10, but gross profit grew more slowly (a CAGR of 13%), due to adverse weather, volatility in commodity prices and the kwacha and a series of acquisitions – some of which have been dilutive (especially that of Zamanita, the largest Zambian oil producer). Zambeef's main issue in the past few years has been a lack of soya and the volatility of

commodity prices, which has particularly affected Zamanita. Its planned acquisition of farms in the Copperbelt should resolve this issue, in our view.

Zambeef's operations cover the whole of Zambia, and it exports some of its products to the DRC (Katanga), Zimbabwe and other countries in the region.

Figure 80: Zambeef's operations in Zambia

Source: Company data

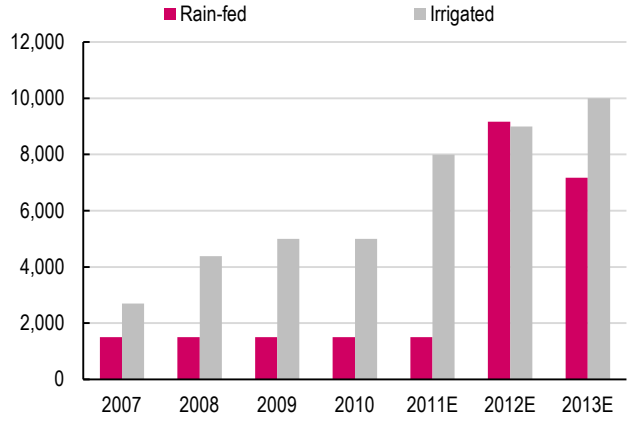
Zambeef crop farms

Zambeef increased its number of farms in 2008 to secure grain for its feedstock production and help to ensure the highest productivity in meat (especially in pork and chicken) and dairy production. Zambeef owns farms in different Zambian provinces (see Figure 80) and has developed one of the largest irrigated row-cropping operations in SSA (according to management). In FY10, it had 5,000 ha of irrigated plantation and 1,500 ha of rain-fed plantation. It continues to expand and has entered into a conditional agreement to acquire farms in Mpongwe (in the Copperbelt) which will add 10,700 ha to the Group's operations, including approximately 3,000 ha of irrigated plantations (the total area of Mpongwe farms is 46,876 ha, but only approximately 10,700 ha is cleared today). The irrigated plantations at Mpongwe will be expanded to 5,000 ha by FY13, according to the Group.

The acquisition of Mpongwe will be transformational, in our view, as it will double the size of the Group's irrigated plantation and increase the size of its rain-fed plantations 6x. This, in turn, should sharply increase the Group's cereals harvest

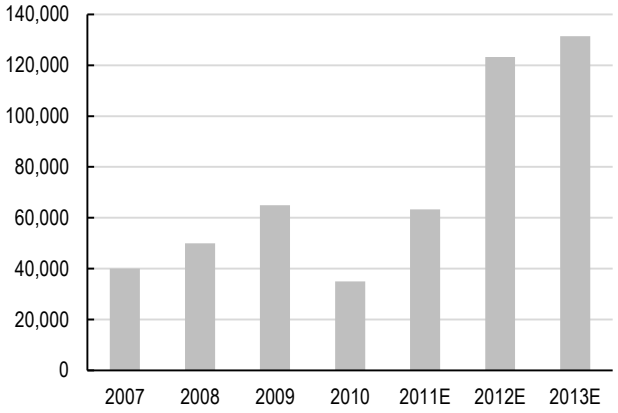
(see Figure 82; the section on Mpongwe in this report sets out greater detail on the assets to be acquired and our expectations).

Figure 81: Zambeef rain-fed and irrigated plantations' size, ha



Source: Company data, Renaissance Capital estimates

Figure 82: Zambeef's grain output, tonnes



Source: Company data, Renaissance Capital estimates

Crop output key to the profitability of Zambeef's other businesses

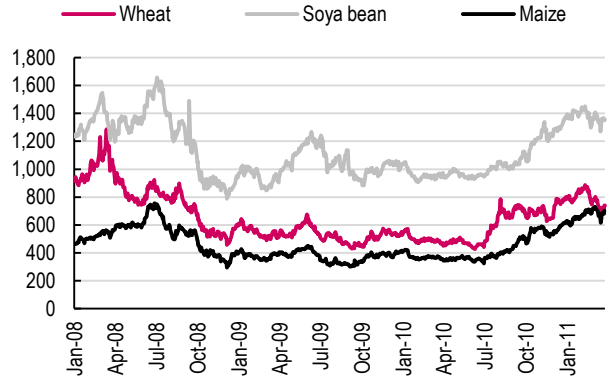
The proposed acquisition of Mpongwe substantially increases plantations and output. We see potential for further expansion on Zambeef's existing land.

Zambeef's vertical integration in crop farming has already substantially helped its meat and dairy production (by providing grain for feedstock production) and supplies its flour mill and bakery. The size of the harvest in the Group's crops segment is key to the profitability of its other segments. Particularly, Zambeef's edible oil and feedstock production need more soya and the Mpongwe acquisition is set to more than triple the Group's soya harvest as from FY12.

Beyond the Mpongwe acquisition, we see potential for expansion at these farms – first through an increase in the irrigated area (taken from rain-fed). There are sufficient water resources in Mpongwe and at Zambeef's other farms to increase the irrigated area at a relatively low cost, as most of the infrastructure is already built. Depending on the progression of cereal prices and the growth in the Group's food production (and feedstock and grain needs) Zambeef will decide to invest more in irrigation and expand its plantations further.

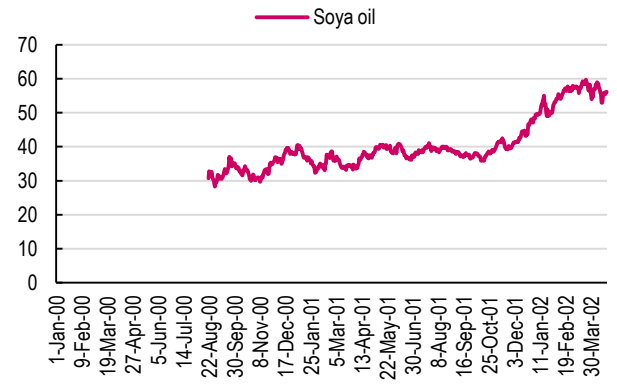
Our cautious forecasts for output growth and gross margins factors in the risk of unfavourable weather.

Figure 83: Maize, wheat and soya beans world prices, USc/bushel



Source: I-Net Bridge

Figure 84: Soya oil world prices, USc/lb



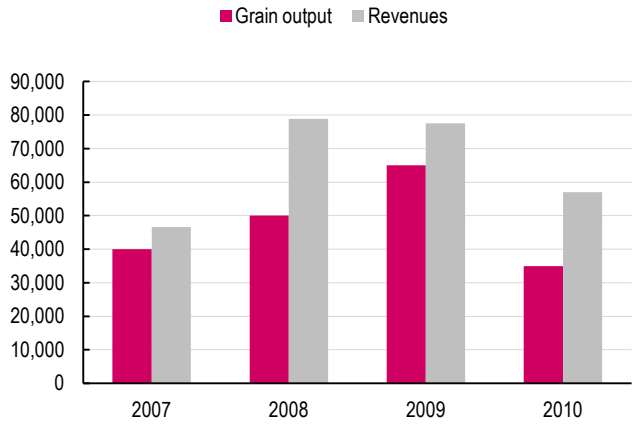
Source: I-Net Bridge

Output and revenues in the crops segment have been volatile, due to changes in weather conditions and commodity prices, with the contribution to the Group's gross profit varying from a high of 23% in 2008 to a low of 9% in 2009. In FY10, output declined 46% YoY, from 65kt to 35kt, and revenues declined 27% YoY (having already declined by 2% in FY09; see Figure 85) which the FY10 annual report explained as a consequence of bad weather. The sale of Nanga farms also had a substantial impact on revenues, if adjusted for the sale of Nanga farms, revenues would have been down 2% according to management. The acquisition of Nanga farms in FY08 explains a large part of the revenue increase in that year and numbers have not been adjusted to reflect organic sales growth only. The change in crop mix also negatively affected output of FY10 (and average yield), as more soya means lower output but is better for the Group (we assume a yield of 3.5 t/ha on rain-fed soya and 7.8 t/ha on maize).

The average yield (see Figure 86) is a raw comparison of the grain output and the area (hectares) available to the Group. It will not reflect changes in the crop mix, but crop revenues should reflect changes in mix that result in better profitability/ha and margins in edible oils and animal feed production should also reflect a change in mix that was positive for soya (or more generally grain) intake. This raw average yield would also be affected by the choice of the Group not to use its available area (information on the cultivated area is not available in the annual report, only the total available area is set out).

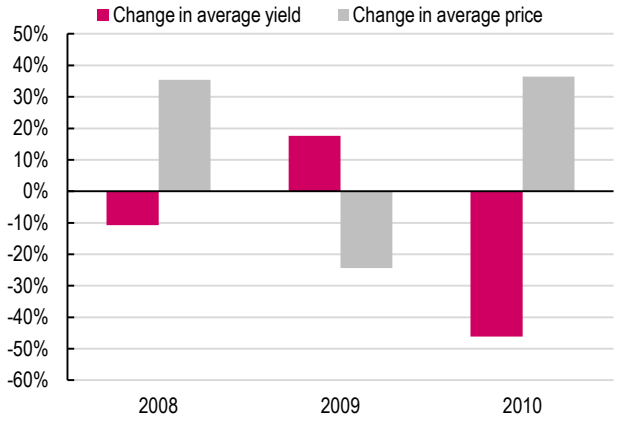
Our forecasts are based on management expectations of average yields in Mpongwe and the other farms, as well as management's planting plans (the focus at Mpongwe will be on soya which should substantially increase in proportion of the total of Mpongwe (see Mpongwe section).

Figure 85: Zambeef crop output (tonnes) and revenues, ZMKbn



Source: Company data, Renaissance Capital estimates

Figure 86: Changes in the average yield per hectare and average price per tonne for Zambeef crop operations



Source: Company data, Renaissance Capital estimates

We believe that poor weather did impact crop output this year on Zambeef's own farms, however we still expect a recovery from the low level of FY10 to 40kt (+14% YoY vs FY10 which was a year of particularly low output). We expect the Group's total grain output to rise by 81% in FY11, to 63kt, including 23kt from Mpongwe (only wheat for FY11). For FY12 and FY13, we respectively forecast 95% and 7% YoY output growth. We assume 45kt for FY12 onwards for Zambeef's other farms. We think this is conservative, as it assumes a stable average yield of 6.9 t/ha for our forecast horizon – well below the yield achieved between FY07 and FY09 on more typical weather conditions (between 8.5 t/ha and 10.0 t/ha). Zambeef continues to invest substantially in its farms. It has already spent $16mn on the farms acquired in 2008, and plans to spend a further $1.7mn on these (not the Mpongwe farms, where it plans to spend a total of $15mn after completion of the acquisition). This should improve yields, and we therefore see upside potential to our crop output forecasts (see detailed forecasts in Figure 87).

Due to the high proportion of intra-group transactions on crops, we do not forecast revenues in this segment based on future cereal prices, even though these transactions certainly happen at arm's length. For FY11, we expect an average price increase of at least 30% to reflect the rise in most commodity prices (maize prices remain low in Zambia, however). For FY12E and FY13E, we do not factor in any price increase. These forecasts imply crop revenue growth of 135% in FY11, 95% in FY12 and 7% in FY13.

Gross margins appeared very low for 1H11 therefore we forecast a gross margin of 35% for crops for FY11. For FY12-13 we cautiously forecast 40% – below the average of FY07-10 (46%) for Zambeef farms and well below management expectations for Mpongwe (54% for FY12 and FY13). This factors in the risks related to weather conditions and the integration of the acquisition, but reinforces our view that there is upside potential to our forecasts if these risks do not materialise.

We forecast the crops segment's contribution to the Group will rise to 17% of revenues and 23% of gross profit by FY13.

Figure 87: Crop output and revenue forecasts (not adjusted for the acquisition and subsequent sale of Nanga farms)

	2007	2008	2009	2010	2011E	2012E	2013E
Revenue, ZMKmn	46,612	78,869	77,573	56,996	134,118	260,884	278,243
% growth	0%	69%	-2%	-27%	135%	80%	7%
Price	0%	35%	-24%	36%	30%	0%	0%
Volume	0%	25%	30%	-46%	81%	95%	7%
% group turnover	14%	13%	9%	6%	12%	18%	17%
Area irrigated, ha	2,700	4,380	5,000	5,000	7,994	8,994	9,994
YoY	0%	62%	14%	0%	60%	13%	11%
Area dry, ha	1,500	1,500	1,500	1,500	1,500	9,167	7,167
YoY	0%	0%	0%	0%	0%	511%	-22%
Total grain output, tonnes	40,000	50,000	65,000	35,000	63,353	123,233	131,433
YoY	0%	25%	30%	-46%	81%	95%	7%
Zambeef existing farms output, tonnes	40,000	50,000	65,000	35,000	40,000	45,000	45,000
YoY	0%	25%	30%	-46%	14%	0%	0%
Mpongwe output, tonnes	-	-	-	-	23,353	78,233	86,433
% of total output	0	0%	0%	0%	37%	63%	66%
Average yield, t/ha	9.5	8.5	10	5.4	6.7	6.8	7.7
YoY	0%	-11%	18%	-46%	34%	-6%	13%
Average price/t, ZMKmn	1.2	1.6	1.2	1.6	2.1	2.1	2.1
YoY	-	0%	0%	0%	0%	-	-
Maize output, tonnes	8,940	5,836	14,000	10,000	13,000	34,630	34,630
YoY	0%	-35%	140%	-29%	30%	166%	0%
Soya output, tonnes	10 000	10,000	12,000	10,000	12,000	42,450	42,850
YoY	0%	0%	20%	-17%	20%	254%	1%
Wheat output, tonnes	21 060	34,164	39,000	15,000	38,353	46,153	53,953
YoY	0%	62%	14%	-62%	156%	20%	17%
Gross profit	25,507	43,156	28,617	21,997	46,941	104,354	111,297
GP%	55%	55%	37%	39%	35%	40%	40%
% of the Group GP	20%	23%	13%	9%	16%	25%	23%

Source: Company data, Renaissance Capital estimates

Expansion to palm plantations

Zambeef has started a palm plantation in northern Zambia, which offers a favourable climate in which to grow palm. It has already planted the first 3,500 ha and will gradually expand the planted area over the coming years (the total potential cultivated area could reach 20,000 ha). The first fruits are expected in FY14.

This will be the first commercial palm plantation in Zambia. Zambeef imports substantial quantities of palm oil for its edible oil production (see below) and the average price landed in Lusaka is currently $1,650/t (including $150/t for sea freight, $250/t for road transportation and 5% in duty). Local palm will allow substantial savings for the Group, and there is substantial demand for palm oil in the region.

Zambia and most of its neighbouring countries are net importers of palm oil. Zamanita (see below) imports roughly 30% of the volumes consumed in Zambia and there is significant potential for Zambeef to replace its imports and others with its own production.

We expect this segment to start contributing to the Group in 2014, when the first harvest will be used for oil production by the company. This is not included in our forecasts or valuation.

Zamanita: Edible oils

In 2008, Zambeef bought Zamanita, the largest edible oil producer in Zambia, which sells palm, soya and cottonseed oils, as well as animal feed cake (a byproduct of oil crushing that is a key ingredient in animal feedstock). It also produces small volumes of water and margarine. Zambeef bought Zamanita to sell its cooking oil, water and margarine through its retail network and use the animal feed cake to expand its production of animal feedstock (a description of this business follows). We see great potential for synergies between Zamanita and Zambeef's other businesses.

The Zamanita acquisition has been very margin-dilutive, as its business generated a lower margin than the Group (large portion of low-value-added imports), needed substantial restructuring and suffered from losses on its forward soya-purchases and an increase in duty rates. Also, three years after integration, margins remain below target, due to a lack of soya beans on the market, which prevents Zamanita from reaching full utilisation.

Product-mix shift towards soya oil and cake to help margins

Zamanita currently imports RDB palm oil, processes it, packages it and distributes it through Zambeef's retail network and other retailers. This is a low value-added business compared with oil crushing and generates low returns. The potential sustainable gross margin of the palm oil import business is about 12%, according to management guidance. However, due to high volatility in exchange rates and oil palm prices, and an unfavourable duty regime, Zamanita had even lower margins on its palm oil business in FY10 (a 0% gross margin during some quarters).

The crushing of soya beans and cotton seeds and the sale of soya cake are much more profitable than the distribution of refined palm oil. Zambeef generates high returns when producing soya oil from the Group's harvest, as the retail oil price is set at import parity (landed oil costs include duties and high transport costs). However, Zamanita has not been able to capitalise on its potential for soya bean crushing, due to insufficient supply in Zambia. Its soya crushing is currently underutilised, and a planned increase in the Group's soya bean output will be the key driver for margin improvements at Zamanita.

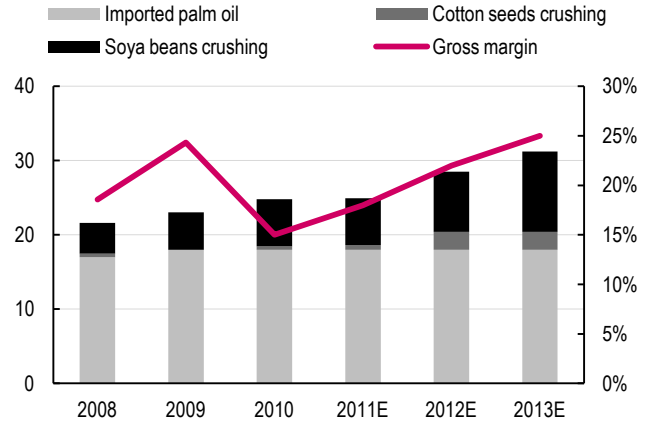
Management has said that when it acquired Zamanita, the product mix was 75% palm oil and 25% soya and cotton. Zamanita's capacity could allow a mix of up to 50% soya and cotton, in a move to substantially lift Zamanita's gross margin above 30%. Management has guided on gross margins of approximately 12% for palm oil imports and 50% for soya and cotton crushing. In our view, a 50% gross margin for soya and cotton crushing is realistic in a scenario of high edible oil prices globally, as Zambeef prices its local production at import parity. However, the 50/50 mix target has so far been unachievable, due to the lack of soya beans. We revise our intake forecasts and we think intake should reach 28% of soya and cotton in FY11 and 37% for FY12 (from 35% and 45% respectively).

Zambeef plans $3.8mn of capex in Zamanita to improve and slightly expand capacity (to 75kt of soya bean intake) and packaging. This should also improve efficiency and support margins.

In FY10, Zambeef secured 35kt of soya beans for Zamanita, 3kt of cotton seeds and imported 18kt of palm oil. Assuming respective extraction ratios of 21% and 16% for soya and cotton, this implies that palm accounted for 73% of Zamanita's oil output in FY10, soya beans 25% and cotton seed 2%. This was already an improvement on FY09 (see our estimated breakdown in Figure 89) however, Zamanita's gross margin declined that year despite the improved mix, due to losses on forward soya contracts, duties on palm oil imports and FX movements.

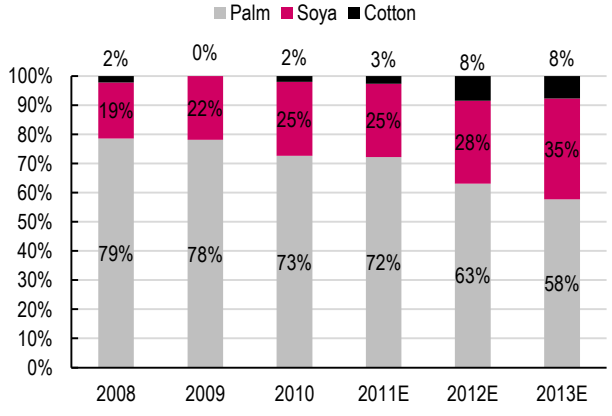
We expect Zamanita's intake to remain at 18kt of palm oil imports over FY11-13. We forecast the cotton seeds intake to rise to 4kt in FY11 and 15kt for FY12 and FY13. We revise downward our forecast for soya intake to 35kt in 2011 (in line with company guidance), 45kt in FY12E and 60kt in FY13E. Soya crushing capacity should peak at 70k tpa by FY14, according to management. We expect Zamanita's gross margin to rise to 18% in FY11, 22% in FY12 and 25% in FY12, based on a gross margin of 45% for soya and cotton crushing. This is relatively cautious, in our view, and factors in the risk of volatility in palm oil prices and exchange rates – both of which can potentially reduce profits, as in FY10. Zamanita's gross margin reached 19% in FY08 and 24% in FY09, thanks to a strong increase in volumes and prices (revenues up 102% in FY09) and an improved mix. We believe margins should return to the high level of FY09 by FY14.

Figure 88: Zamanita's gross margin (left axis) and palm, soya and cotton oil volumes, kt



Source: Company data, Renaissance Capital estimates

Figure 89: Estimated breakdown of Zamanita's oil output



Source: Renaissance Capital estimates

Based on our forecasts, Zamanita will remain a key segment of the Group and account for 22% of revenues by 2013E and 19% of gross profit. Medium-to-long term, we see substantial growth potential for Zamanita, as even at full capacity it will only supply a proportion of the cooking oil consumed in Zambia (18k tpa of palm oil out of a 60k tpa market) and a large part of the market remains imported. If the supply of grain increases and allows more production, Zambeef will be well placed to increase Zamanita's capacity and tap into this additional growth.

Figure 90: Zamanita historicals and forecasts

	2008	2009	2010	2011E	2012E	2013E
Revenue, ZMKmn	119,971	242,277	239,946	289,794	331,160	362,533
% growth	0%	102%	-1%	21%	14%	9%
Price	0%	0%	5%	20%	0%	0%
Volume	0%	0%	10%	1%	14%	9%
Palm oil intake, kt	17	18	18	18	18	18
Soya bean crushed, kt	23	28	35	35	45	60
in % of group output	230%	233%	350%	292%	106%	140%
crushing ratio	18%	18%	18%	18%	18%	18%
Soya oil crushing, kt	4	5	6	6	8	11
Cotton seeds crushed, kt	3	0	3	4	15	15
crushing ratio	16%	16%	16%	16%	16%	16%
Cotton seed oil crushing, kt	0.5	0.0	0.5	0.6	2.4	2.4
Total oil output, kt	22	23	25	25	29	31
YoY	0%	7%	8%	1%	14%	9%
% of imported palm oil	79%	78%	73%	72%	63%	58%
% of soya oil	19%	22%	25%	25%	28%	35%
% of cotton seed oil	2%	0%	2%	3%	8%	8%
Gross profit, ZMKmn	22,274	58,880	36,048	52,163	72,855	90,633
GP%	19%	24%	15%	18%	22%	25%

Source: Company data, Renaissance Capital estimates

Palm oil production and better capacity should also help profitability

Zamanita currently incurs seafreight costs, road transportation costs and duties of $365/t on palm oil imports from Malaysia. Longer term, we expect the replacement of palm oil imports with Zambeef's own production to substantially increase profitability at Zamanita, as the 50% of volumes in palm oil should reach similar profitability levels as soya and cotton crushing. Zambeef's harvest of palm fruits will gradually start replacing imports from FY14, if the plantation achieves its production targets on time.

Novatek: Animal feed

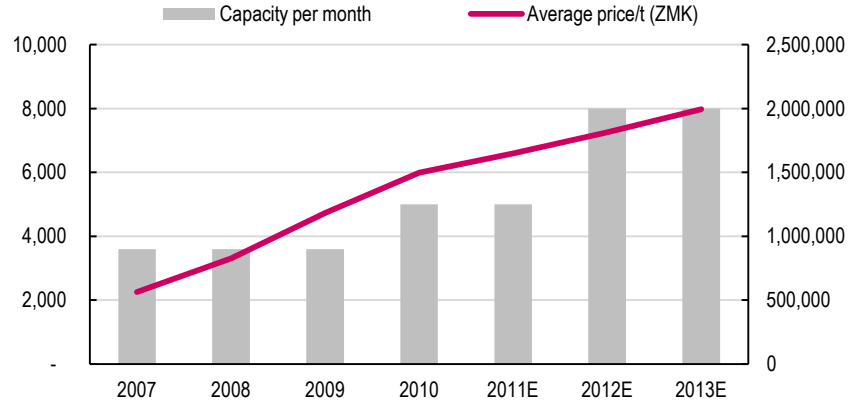
Zambeef produces animal feed (feedstock) for the Group's meat, egg and dairy production (internal feedstock sales currently account for 35% of the total) as well as external clients (meat and dairy producers competing with Zambeef). Before FY10, Zambeef was producing 3,600 tpm of feedstock on site (close to its farms) and was mainly focused on supplying internal demand. The strong growth in meat and dairy production in Zambia and the rest of the region has created huge demand for feedstock, and Zambeef has sought to serve that demand.

In February 2010, Zambeef invested in and commissioned a modern, large-scale plant, with capacity of 8,000 tpm for internal demand and external clients. Packaging capacity has recently been increased to 7,000 tpm (from 5,000 tpm). The demand for bulk feedstock (not packaged) is currently limited (but could increase in the medium term). Hence, the plant operates at the maximum of its packaging capacity (very low bulk sales). The feedstock is Novatek-branded, and is aggressively marketed to Zambeef competitors. Producing for competitors gives Zambeef's feedstock business greater scale and reduces the cost to the Group of supplying its internal feedstock demand.

A very successful start for Novatek

When we visited the new plant, the factory manager commented that the new plant has led to a dramatic increase in quality, translating into higher yields in meat and dairy production.

Figure 91: Novatek monthly capacity (tonnes) and average price/t, ZMK



Source: Renaissance Capital estimates

Strong growth potential in Zambia, exports to the region and product-range extension

Novatek has a 30% market share in Zambia and competes head-to-head with Tiger feed (Astral Group) which also has a 30% market share. It has quickly gained market share in the space of six months as it is pricing aggressively to fill its capacity quickly (5-10% down vs its competitors). After increasing capacity, management expects Novatek will be the largest producer in Zambia. The market is growing fast enough for both Novatek and Tiger to see strong volume growth. Novatek is, however, better placed, in our view, as it benefits from vertical integration and a larger, more modern plant.

Novatek has started supplying Zimbabwe where there is very little local feedstock and the rapid take-off of meat production (poultry and pork especially) has created large demand for imported feedstock. The meat production industry in Zimbabwe has already reached the same size as that in Zambia, and is set to grow further, but feedstock production remains very low as existing capacity needs substantial refurbishment and upgrades (it lagged the food industry in recapitalising) and also as there are not enough soya beans available for large-scale feedstock production. We expect Zimbabwean feedstock producers to gradually increase volumes.

We forecast a CAGR of 35% for the top line and 37% for gross profit over FY10-13. We regard our forecast of a 22% gross margin as cautious

We think the ramp-up of the additional capacity will support strong volume growth in FY11 and FY12. We also expect prices to continue rising as Novatek continues to expand its product range (prices tripled between FY07 and FY10 – this also partially reflects higher commodity prices). We forecast top-line growth of 28% in FY11, 32% in FY12 and 47% in FY13.

While the margin in feedstock production is also at risk of volatility in commodity prices, Zambeef's vertical integration provides some protection. Novatek currently requires 30,000 tpa of maize, about 18,000 tpa of soya and 6,000 tpa of wheat bran. Large quantities of both maize and soya have to be supplied externally as the Group's farms output is insufficient (see section on the Mpongwe farms acquisition, in Figure 101). The Mpongwe farms acquisition will increase the Group's cereal output, and especially soya output. Novatek will continue to need to source large quantities of maize externally. However, large quantities of maize are currently available in Zambia due to government subsidies. The FY10 harvest reached a record of 2.8mnt as the government encourages small-scale farmers to plant maize with subsidies (maize is a key staple in Zambia and the government has a strong interest in maintaining maize prices at an affordable level even if it implies paying subsidies). Maize prices have therefore been relatively low and with a surplus on the market. Hence, Zambeef has only focused on securing the soya supply for Novatek and Zamanita.

The new plant was only operational for six months in FY10 which suggests upside potential to the 21.2% gross margin achieved in FY10 – 24% was achieved for 1H11. Also, more soya beans and cake available from the Group, the larger capacity in FY12E and the expanded product range should lead to stronger margins post FY12E. We forecast a gross margin of 22% over FY11-13. We expect Novatek to account for 12% of FY13 Group revenues and 9% of gross profit.

Figure 92: Novatek historical and forecasts

	2007	2008	2009	2010	2011E	2012E	2013E
Revenue, ZMKmn	24,323	35,715	51,093	77,333	98,914	130,567	191,498
YoY		47%	43%	51%	28%	32%	47%
% Group turnover	7%	6%	6%	9%	9%	9%	12%
Capacity/month, tonnes	3,600	3,600	3,600	5,000	5,000	8,000	8,000
YoY		0%	0%	39%	0%	60%	0%
Price/t, ZMK	563,032	826,736	1,182,708	1,498,702	1,648,572	1,813,429	1,994,772
YoY		47%	43%	27%	10%	10%	10%
Gross profit, ZMKmn	4,951	4,415	11,110	16,414	21,761	28,725	42,130
GP%	20%	12%	22%	21%	22%	22%	22%

Source: Company data, Renaissance Capital estimates

Meat, dairy and egg production

This is the core of the Group's food production with the largest contribution coming from beef (23% of FY10 revenues, 26% of gross profit) and chicken (9% of revenues and profit).

This segment has seen strong growth over the past few years, on the back of capacity expansion (abattoirs and feedlotting) and productivity improvement (better feedstock), especially in chicken and pork.

Zambeef

Zambeef owns nine abattoirs around Zambia where it can slaughter up to 120,000 cattle per year (according to the company). It can also accommodate and fatten 15,000-20,000 animals in feedlotting. Zambeef is the dominant player in this market, which is growing well in Zambia. However, the beef segment's performance depends on the availability of beef for sale on the market, which in turn depends on the quantity of healthy animals available and the willingness of Zambian farmers to sell animals. Many Zambian farmers use cattle to accumulate wealth and are

reluctant to sell them except when they need cash. Since FY10, generous government maize subsidies have increased disposable incomes for small-scale farmers and reduced their willingness to sell beef. This has dramatically reduced the supply on the market. In FY10, beef volumes decreased, due to a lack of animals on the market. The government continues to subsidise maize and we think FY11 is unlikely to see significant growth in beef.

Besides exposure to cereal prices, the beef production business is also at risk of cattle diseases which constrains cattle and meat movements in the country. In FY09, Zambeef's margins in beef production decreased due to the impact of the removal of circulation restrictions on beef from the Southern province (restrictions imposed previously due to diseases in that province). The margin declined from 37% in FY08 to 27% in FY09, due to the price shock following restriction removals (a lot more beef became available).

Zambeef also produces other meats, which helps it to absorb the impact of changes in beef prices. Higher beef prices helped chicken and pork demand in FY10, while lower beef prices reduced the demand for chicken in 2009.

We expect the beef top-line to remain flat in FY11 and then grow 10%. We forecast the gross margin at 30%, slightly below the FY10 level, but above the 1H11 level of 26.5%.

Figure 93: Beef segment – historical and forecasts, ZMKmn

	2007	2008	2009	2010	2011E	2012E	2013E
Revenues, ZMKmn	134,930	166,222	224,729	202,895	202,895	223,692	246,620
YoY		23%	35%	-10%	0%	10%	10%
% group turnover	41%	28%	26%	23%	18%	16%	15%
Cattle processed	60,000	60,000	60,000	64,000	64,000	67,200	70,560
YoY	0%	0%	0%	7%	0%	5%	5%
Price/beef processed, ZMK	2.25	2.77	3.75	3.17	3.20	3.30	3.50
YoY	0%	23%	35%	-15%	0%	5%	5%
Gross profit	47,065	61,589	60,222	63,320	60,869	67,108	73,986
gross margin	35%	37%	27%	31%	30%	30%	30%

Source: Company data, Renaissance Capital estimates

Masterpork to continue to see capacity expansion and pricing improvement

Masterpork, Zambeef's pork segment, is the largest pork producer and processor in Zambia. It slaughtered and processed 42,000 pigs in FY10 including 7,000 from its own production. This business has been rising quickly on capacity increases, and Zambeef recently doubled its processing capacity again. Zambeef estimates its market share at 60% of the formal market (about 50% of the market is informal). Its recent capacity increase will increase its market share.

We expect pork processed to rise 15% in FY11 and 10% in FY12 and FY13, on the back of the substantial increase in capacity at Masterpork. Prices are likely to continue to improve over the next three years (average price increases come from product mix improvement. Our top-line growth forecasts come in at 24% for FY11, 19% for FY12 and 12% for FY13.

We forecast the gross margin at 30% for the next three years, which is slightly below the 31.2% achieved in FY10, and below 34.6% achieved in 1H11. In our view, there is upside potential to our forecasts as the new capacity at Masterpork is likely to be more efficient and the increased availability of feedstock from Novatek should

improve productivity (see the yield improvements already achieved in dairy and chicken) and reduce feedstock costs.

Figure 94: Pork segment – historical and forecasts, ZMKmn

	2007	2008	2009	2010	2011E	2012E	2013E
Revenue, ZMKmn		28,082	47,142	64,288	79,846	94,857	106,429
% growth		0%	68%	36%	24%	19%	12%
% group turnover		5%	5%	7%	7%	7%	7%
Pigs processed		25,000	36,000	42,000	48,300	53,130	58,443
YoY		0%	44%	17%	15%	10%	10%
Price/pig processed, ZMK		1.12	1.31	1.53	1.65	1.79	1.82
YoY		-	17%	17%	8%	8%	2%
Gross profit		12,128	10,391	20,084	23,954	28,457	31,929
GP%		43%	22%	31%	30%	30%	30%

Source: Company data, Renaissance Capital estimates

Chicken and eggs

Zambeef is the largest chicken producer in Zambia with a market share of about 45% (company estimates) of the formal market (the informal market accounts for about 60% of the total). This market is growing fast, and we expect demand to remain strong. We forecast 5% growth in volumes and 10% in the average price (price-mix improvements as the product range is expanded) for Zambeef over FY11-13, and a stable margin of 22%.

Figure 95: Chicken segment – historical and forecasts, ZMKmn

	2007	2008	2009	2010	2011E	2012E	2013E
Revenue	43,318	51,425	59,504	83,382	96,306	111,234	122,635
% Growth		19%	16%	40%	16%	16%	10%
Chickens processed, mn	3.5	3.5	4.0	3.5	3.7	3.9	4.1
YoY		0%	14%	-13%	5%	5%	5%
Average price, ZMK		14,693	14,876	23,823	26,206	28,826	30,268
YoY		-	1%	60%	10%	10%	5%
Gross profit	12,439	11,303	5,185	20,978	21,187	24,471	26,980
GP%	29%	22%	9%	25%	22%	22%	22%

Source: Company data, Renaissance Capital estimates

Eggs accounted for 2% of FY10 revenues and 4% of gross profit (not included in chicken). We expect this business's revenues and profits to grow roughly in line with the Group, and it should account for 2% of revenues and 3% of gross profit in FY13E.

Zammilk (5% of revenues and 11% of gross profit in FY10)

Zambeef's dairy processes between 5.5-7mn litres of milk per year, from its own milking herd and external farmers. It has expanded its product range to include a variety of value-added products from yoghurts and cheese to juices. This has driven strong growth in the average price and gross profit per litre over 2007-2010, while overall milk production was stable (slightly declining in FY10).

Parmalat is the largest dairy operator in Zambia (2x larger than Zambeef in terms of market share), it has a strong brand and a large distribution network. Zambeef's management expects to remain number two in the market, but still sees large expansion potential in the business. It has gained substantial market share from Parmalat in the past few years and has launched a number of innovative products on which it can earn high margins and dominate the market (e.g. drinking yoghurt, where it has more than an 80% market share).

We regard our forecasts as cautious (see below), and assume no further market share gains. The Group's nationwide retail network (see below) can support the expansion of the dairy product range. Zambeef's brand is also strong, and we believe it has the potential to gain market share from Parmalat. Also, its vertical integration lower in the value chain is a significant advantage. We believe this segment of the Group has promising prospects, as Zambeef's downwards and upwards integration (better position than Parmalat) and strong focus on innovation could contribute to making it a dominant player in dairy, in Zambia and the region.

Over 2007-2010, Zammilk's top-line growth (a CAGR of 14%) was more driven by an improving price-mix (more value added products) than by volumes. Management has commented that it intends to increase the milking herd and that milking herd yields have increased 30% since Novatek starting producing specific dairy feed six-to-12 months ago.

We forecast sales to continue increasing at a CAGR of 14% for FY11-13, partially on volumes (more cows and better yields) and continuing price improvements (more value-added products). Zammilk earns the highest gross margins in the Group, with an average of 61% over FY07-10, taking into account years where feedstock prices were high (a low of 45% in FY09). We see potential upside on margins as the price-mix and better yields should continue to help profitability. We cautiously forecast the gross margin at 60% for FY11-13 (67% was achieved in 1H11).

Zammilk will account for 4% of FY13 Group revenues and 8% of gross profit. However, we believe there is potential for Zammilk to grow much faster than our forecasts.

Figure 96: Zammilk historicals and forecasts (the average price/litre also includes value-added products)

	2007	2008	2009	2010	2011E	2012E	2013E
Revenue, ZMKmn	28,797	32,202	40,789	42,572	49,282	57,051	62,898
YoY		12%	27%	4%	16%	16%	10%
Milking herd, cows	850	850	850	700	735	772	810
YoY	-	-	-	-18%	5%	5%	5%
l/cow	24	24	24	22	23	24	24
YoY	-	-	-	-	5%	5%	0%
Total milk annually, mn litres	7.30	7.30	7.30	5.50	6.10	6.70	7.00
YoY	-	-	-	-25%	10%	10%	5%
Average price/litre, ZMK	3,945	4,411	5,588	7,740	8,127	8,534	8,960
YoY	-	12%	27%	39%	5%	5%	5%
Gross profit, ZMKmn	21,325	19,158	18,197	27,665	29,569	34,230	37,739
Margin	74%	60%	45%	65%	60%	60%	60%
Gross profit/litre, ZMK	2,921	2,624	2,493	5,030	4,876	5,120	5,376
YoY		-10%	-5%	102%	-3%	5%	5%

Source: Company data, Renaissance Capital estimates

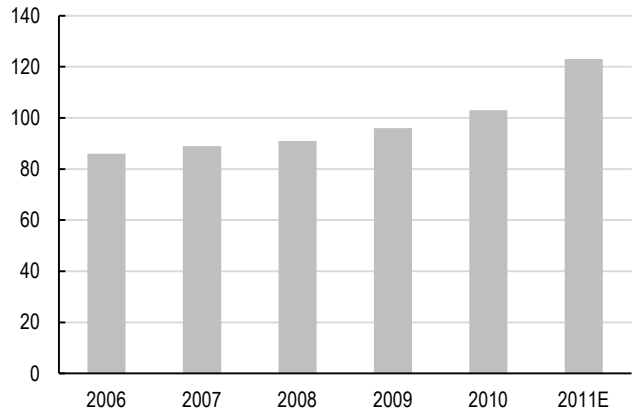
Zambeef's retail network

Zambeef's network comprises 114 stores (94 of its own stores and 20 Shoprite/independent supermarket butcheries) that sell its meat, dairy, oil and other products (see below). This retail network distributes most of Zambeef's production (95% of meat and dairy volumes, and 40% of edible oils) and has been a key driver of Zambeef's top-line growth.

Zambeef continues to expand its own retail network and plans to open eight more stores by end-FY11 (mostly in the Copperbelt, but also in other outlying areas of Zambia) (seven were opened during 1H11 and eight existing stores were

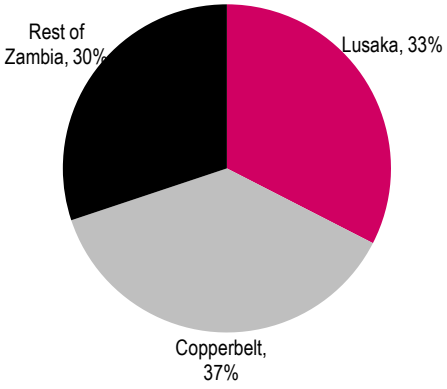
refurbished). Shoprite has plans to continue expanding its footprint in Zambia, and Zambeef is expected to remain its partner.

Figure 97: Zambeef retail network (number of stores)



Source: Company data, Renaissance Capital estimates

Figure 98: Zambeef's stores geographic distribution



Source: Company data

Expansion into wholesale distribution

As in the rest of SSA, the majority of food distribution remains informal, and Zambeef intends to address this market with a new wholesale network. These wholesale warehouses will sell perishable and non-perishable Zambeef products to informal traders. Two wholesale depots were opened during 1H11 and subsequent centres are planned for Chingola and Solwezi to obtain market share from the informal sector.

Other businesses

Zamflour and Zamloaf: 5% of revenues and 4% of gross profit in FY10

Zambeef mills a large quantity of its wheat to sell flour and produce bakery products all sold through its retail network.

Zamfish: 1% of revenues and gross profit in FY10

Zambeef has started importing fish to expand its protein range, and sees potential in this business as demand for protein grows in the region, with fish accounting for a substantial part of this growth.

Zamleather and Zamshu: 1% of revenues and 2% gross profit in FY10

This business uses meat byproducts (cattle hides) to produce leather and shoes, which are exported as wet blue and sold as finished leather, and converted to shoes and industrial leatherwear for sale through its supermarket and retail network (Shoprite and independents; not in Zambeef food stores, 1% of revenues and 2% gross profit in FY10) and mining and security companies.

Figure 99: Zamleather, Zamshu, Zamfish, Zamflour, Zamloaf – historicals and forecasts, ZMKmn

	2007	2008	2009	2010	2011E	2012E	2013E
Zamleather and Zamshu							
Revenue	9,296	8,846	8,542	10,749	11,286	11,851	12,443
% growth	0%	-5%	-3%	26%	5%	5%	5%
% group turnover	3%	1%	1%	1%	1%	1%	1%
Gross profit	4,384	2,057	2,347	3,739	3,725	3,911	4,106
GP%	47%	23%	28%	35%	33%	33%	33%
Zamfish							
Revenue	1,266	2,505	7,930	8,992	10,341	11,892	13,676
% growth	0%	98%	217%	13%	15%	15%	15%
% group turnover	0%	0%	1%	1%	1%	1%	1%
Gross profit	751	776	2,023	2,300	2,645	3,042	3,498
GP%	59%	31%	26%	26%	26%	26%	26%
Zamflour and Zamloaf							
Revenue	13,673	31,063	47,156	47,276	52,004	57,204	62,924
% growth	0%	127%	52%	0%	10%	10%	10%
% group turnover	4%	5%	5%	5%	5%	4%	4%
Gross profit, ZMKmn	1,196	5,561	4,990	10,818	9,361	10,297	11,326
GP%	9%	18%	11%	23%	18%	18%	18%

Source: Company data, Renaissance Capital estimates

Zamchick Inns: 1% of group FY10 revenues, 2% of gross profit

This business consists of eight fast-food restaurants offering chicken-based dishes. The concept is currently under review as the chain has not grown for the past two years while the company has been establishing a new strategy. It recently hired a new manager to lead the segment, and is currently fine-tuning the new strategy before implementing in the coming months or years. Management believes there is substantial potential for the chain to take market share and be profitable as it owns the supply.

We do not account for substantial growth. We expect Zamchick Inns to remain a small business within the next three years.

Figure 100: Zamchick – financials and forecasts, ZMKmn

	2007	2008	2009	2010	2011E	2012E	2013E
Revenue	6,804	7,255	8,297	8,547	8,974	9,872	10,859
% growth		7%	14%	3%	5%	10%	10%
% group turnover	2%	1%	1%	1%	1%	1%	1%
Number of restaurants				8	9	10	11
Revenue per restaurant				1,068	997	987	987
YoY				0%	-7%	-1%	0%
Gross profit	2,450	2,062	3,188	3,758	3,231	3,554	3,909
GP%	36%	28%	38%	44%	36%	36%	36%

Source: Company data, Renaissance Capital estimates

The Mpongwe farms acquisition

The Mpongwe acquisition will help Zambeef secure enough supply for the turnaround of Zamanita (edible oils) and the ramp-up of Novatek (feedstock), and achieve better returns on its food production (on better feedstock).

Record-high yields and abundant water for irrigation

The farms cover three estates totalling approximately 47,000 ha, including 12,700 ha of cleared land (2,000 ha are dedicated to Jatropha and will not be used to expand Zambeef's cropping operations).

A report by independent consultant, Bosch, hired by Zambeef to assess the agricultural potential of Mpongwe, identified large water reserves, allowing a rapid 2,000-ha increase in the irrigated area, to 5,000 ha. The Kafue river is close to the farms (adjacent to one of the estates) and can provide additional water for irrigation. Management is confident that there is sufficient water to irrigate 10,000 ha in Mpongwe if need be, although this will depend on cereal prices and the needs of the Group.

Soil quality at Mpongwe is very high and the level of precipitation is optimal. The rain-fed plantations here exceed the yields achieved by Zambeef's irrigated plantations to date. Its record yields for cereals are well above the level used in our forecasts (the highest yield for soya beans was 4.2 t/ha and we use 3.7 t/ha in our forecasts for irrigated soya). In our view, the yield used in our forecasts factors in the risk from adverse weather conditions and delays to refurbishment and expansion of the farms.

The farms, including land, equipment and machinery, were independently valued by Knight Frank at ZMK282bn ($59mn) in December 2009, suggesting the price paid by Zambeef ($47mn) is attractive (only assets were acquired, no liabilities included). We have no clear explanation for why the previous owner, ETC, accepted a lower amount than Knight Frank's valuation.

Why did Zambeef need to buy the Mpongwe farms?

While the farms had the potential to produce 31k tpa of soya (after expansion), the current owner had a different view on production and allocation of land between soya and maize, as it is does not have higher value-added production (such as edible oil or feedstock) that required soya, as Zambeef does. ETC would choose to allocate land to crops depending on the expected value of the harvest (grain prices, output expectations in Zambia, potential for exports) and would not necessarily favour soya despite the lack of availability of soya and Zambeef's requirement.

Also, even if Zambeef could buy forward a large part of ETC's crop, it was difficult for Zambeef to negotiate to be the sole offtaker of the crop as ETC would also sell part of the harvest to other clients. For FY11, Zambeef's management expects to buy between 10-15kt of soya from ETC. We note that 20kt would account for ETC's entire harvest (5.5 ha x 3.75 t/ha – mostly irrigated – amounts to 20kt). We believe Zambeef may not be able to secure the whole of ETC's harvest (or 20kt) this year.

Zambeef, as the owner of the farms, should be able to maximise soya output (by undertaking the necessary capex on irrigation refurbishment and expansion) and will be the sole offtaker of the harvest. Without this additional intake of soya, it will be difficult to achieve the intended turnaround at Zamanita and the ramp-up of Novatek. Figures 101, 105 and 106 illustrate the large increase in cereals required by the Group.

Figure 101: Zambeef – cereals requirements vs Group cereals output, tonnes

	2007	2008	2009	2010	2011E	2012E	2013E
Total wheat requirements	34,320	34,320	34,320	36,000	36,000	39,600	39,600
% of group output	163%	100%	88%	240%	94%	86%	73%
Bakeries	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Novatek	4,320	4,320	4,320	6,000	6,000	9,600	9,600
Total maize requirements	26,160	26,160	26,160	35,400	35,400	55,200	55,200
% of group output	293%	448%	187%	354%	272%	159%	159%
Bakeries	2,400	2,400	2,400	2,400	2,400	2,400	2,400
Novatek	23,760	23,760	23,760	33,000	33,000	52,800	52,800
Zamanita/Novatek soya requirements		10,000	12,000	33,000	35,000	45,000	60,000
% of group output		100%	100%	330%	292%	106%	140%

Source: Company data, Renaissance Capital estimates

The expansion of Mpongwe

The capex plan for the expansion of Mpongwe follows the recommendation of the Bosch report, which recommended that $15mn should be spent on refurbishing and expanding the irrigation systems of the farms. This will enable the irrigation area to be expanded by 2,000 ha and improve the existing 3,000 ha irrigated. Compared with the capex undertaken at Zambeef's other farms, this is relatively cheap as Zambeef has spent $16mn on expanding Chiawa by 1,700 ha, gets much lower yields on this farm and took (relatively) much longer than the expected two years for Mpongwe.

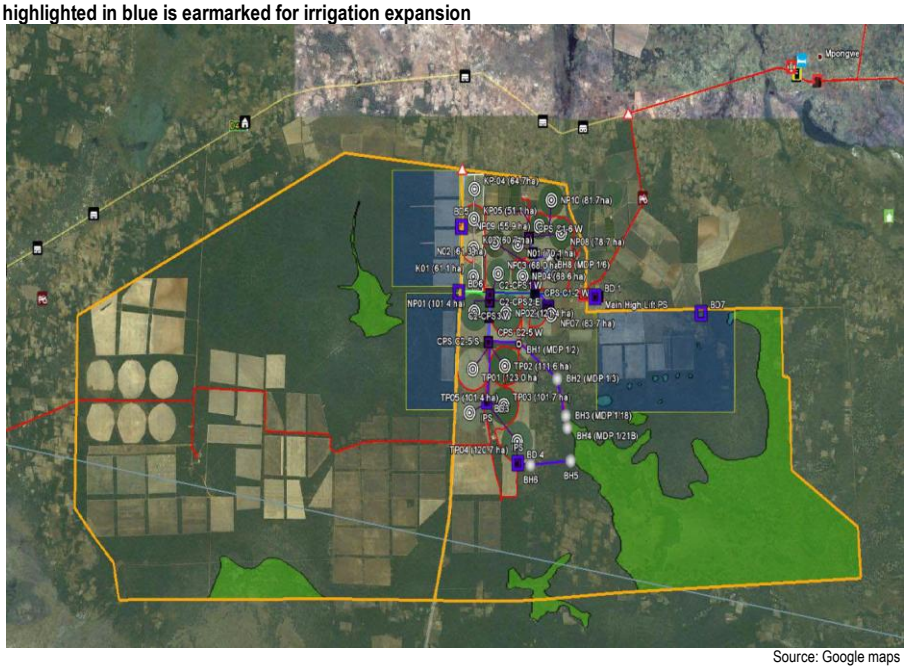
The faster and cheaper expansion of Mpongwe reflects the fact that the farm has large quantities of land cleared and prepared for plantations and Zambeef is therefore saving substantial capex and time (according to management, clearance and preparation would have cost up to $5,000/ha and taken from six months to a year). 10,700 ha of Mpongwe farms are already available (excluding the area where Jatropha is planted) for plantation and irrigation at relatively low cost which makes the farms even more attractive (see Figures 103 and 104, the area earmarked for the irrigation expansion is highlighted in blue and is already cleared and ready for cultivation). Figures 103 and 104 show that there is a significant area of land available at the farms for further expansion of the irrigated area.

Figure 102: Mpongwe farms – output forecasts, tonnes

	2010	2011E	2012E	2013E	2014E	2015E
Soya - dry plantation	4,208	4,208	5,535	3,535	3,535	3,535
expected yield	3.5	3.5	3.5	3.5	3.5	3.5
Soya - irrigated plantation	1,247	1,247	2,994	4,994	4,994	4,994
expected yield	3.7	3.7	3.7	3.7	3.7	3.7
Total soya - area planted	5,455	5,455	8,529	8,529	8,529	8,529
Average yield	3.5	3.5	3.6	3.6	3.6	3.6
Total soya production	19,342	19,342	30,450	30,850	30,850	30,850
YoY	0%	0%	57%	1%	0%	0%
Maize - dry plantation	2,518	2,518	2,132	2,132	2,132	2,132
expected yield	7.8	7.8	7.8	7.8	7.8	7.8
Total maize production	9,727	9,727	16,630	16,630	16,630	16,630
YoY	0%	0%	71%	0%	0%	0%
Wheat - irrigated plantation	1,326	2,994	3,994	4,994	4,994	4,994
expected yield	7.8	7.8	7.8	7.8	7.8	7.8
Total wheat production	10,343	23,353	31,153	38,953	38,953	38,953
YoY	0%	126%	33%	25%	0%	0%
Total grain output	39,411	52,422	78,233	86,433	86,433	86,433
YoY	0%	33%	49%	10%	0%	0%
Total dry	5,455	5,455	7,667	5,667	5,667	5,667
YoY	0%	0%	41%	-26%	0%	0%
Total irrigated (double crop - summer and winter)	2,573	4,241	6,988	9,988	9,988	9,988
YoY	0%	65%	65%	43%	0%	0%

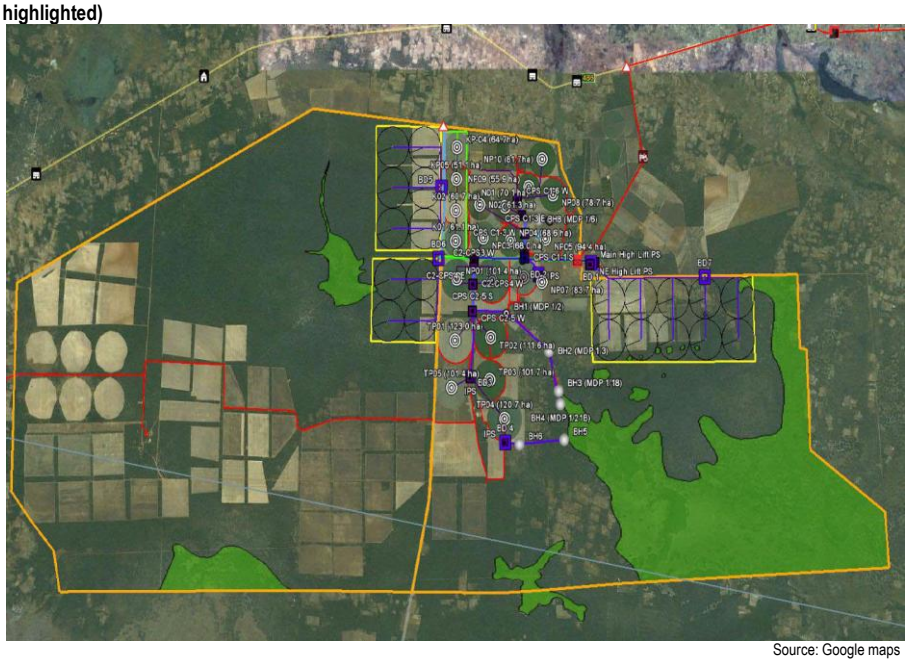
Source: Company data, Renaissance Capital estimates

Figure 103: Mpongwe fams: Aerial view of Chambatata and Nampamba (two of the three estates). Area highlighted in blue is earmarked for irrigation expansion



Source: Google maps

Figure 104: Mpongwe fams: Aerial view of Chambatata and Nampamba (planned new irrigated fields highlighted)



Source: Google maps

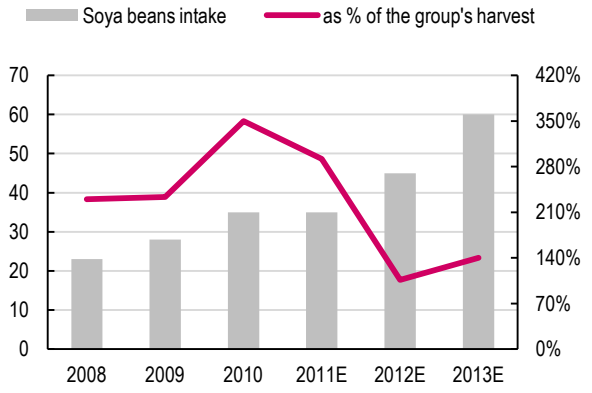
Production forecasts: Any delay will be negative for the rest of the business

Our forecasts are based on management targets for expansion at Mpongwe. Any delay in the implementation of the expansion would imply lower output and, potentially, a slower turnaround at Zamanita and ramp-up at Novatek. Our forecasts for the Group's other farms are, however, very cautious (see previous section) and we see substantial upside risk to that output.

A delay at Mpongwe, would also have a negative impact on food production (lower availability of feedstock) but our forecasts cautiously exclude any margin improvements from better feedstock.

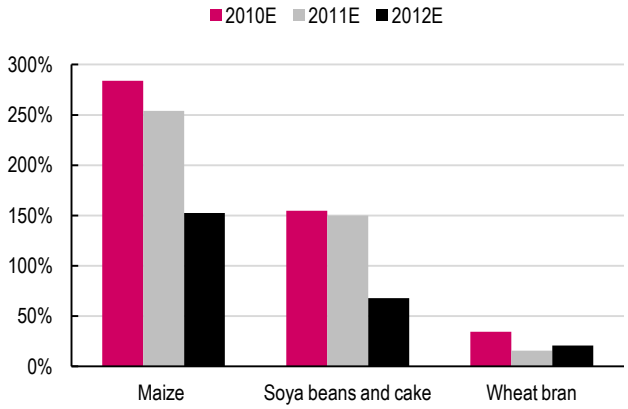
In terms of project delivery, the Group has typically suffered from delays in implementing new operations (Novatek started a year behind plan, the Zamchick Inn expansion has been put on hold). However, we believe Zambeef's expansion at Mpongwe should be more successful, as this is not a new business to the Group (Zambeef runs other farms and has retained existing management at Mpongwe); and the fact that the land is already cleared and prepared should make this expansion easier than other earlier projects.

Figure 105: Zamanita's estimated intake of soya beans, kt



Source: Renaissance Capital estimates

Figure 106: Novatek's estimated intake of cereals as % of Group output



Source: Renaissance Capital estimates

West African expansion

Zambeef started operations in West Africa in 2005, when it accompanied Shoprite (as its partner in meat retailing) in the latter's expansion in Nigeria and Ghana. It now runs butcheries in two Shoprite stores in Lagos and one in Ghana. Zambeef has also invested in a farm in Ogun state (long-term lease), close to Lagos, and meat processing in Ghana (based on mostly imported meat).

We think Nigeria and Ghana offer a very significant opportunity for Zambeef to repeat its successful Zambian model in much more populous countries with rapidly rising urban populations. Demand for processed meat arising from formal sector expansion in West Africa is likely to be very strong, and the combined population of Nigeria and Ghana's large cities, where Shoprite is likely to expand, far exceeds the population Zambeef can reach in Zambia.

Shoprite expansion in West Africa; potential for Zambeef

The growth in Zambeef's West Africa revenues will follow the pace of Shoprite's expansion in these countries as Zambeef intends to continue partnering with Shoprite. Shoprite had first-mover advantage in Nigeria, and has since been followed by other South African and international retailers. Shoprite now plans to accelerate its expansion in West Africa: it has said it should have at least 100 stores in Nigeria (over the medium-to-long term; this is quoted from an interview with Shoprite's management, in our report *Shoprite – Expansion strategy – 20 questions for management*, dated 8 March 2011) and that expansion was getting easier in Nigeria owing to real estate developers and banks become more supportive. Shoprite opened one new store in Enugu in September 2011 and expects to roll out three more over the next 12 months. Other large Nigerian cities will be targeted, such as Abuja, Port Harcourt, Illorin, Kano and Kaduna.

If six openings per year is achieved, Zambeef's revenues will likely quadruple next year, and almost double the following year (this only takes into account the potential from the partnership with Shoprite; Zambeef could also develop its own network or distribution). While demand in Nigeria will absorb six new stores per year, on our estimates, logistics remain a challenge, and we therefore base our forecasts on three Shoprite openings per year (see below).

In Ghana, expansion will be slower as demand is not as large as in Nigeria. On the other hand, logistics here are much easier and we believe it reasonable to expect one new store opening every two years, implying strong growth for Zambeef (from its current base of two butcheries).

Expansion in farming and processing to support growth

Growth in Nigeria has been constrained by the import ban on meat and the difficulties in sourcing good quality meat locally. Zambeef has now invested in its own farm in Ogun state, and will spend $1.3mn in FY11 to upgrade and expand its abattoirs and processing facilities. We think these investments will allow Zambeef to grow much faster in Nigeria.

Nigeria accounted for 2% of FY10 revenues and Ghana for 1%. We expect this contribution to increase to 8% of group revenues by FY13. Our forecasts imply a revenue CAGR of 59% over FY10-13 – above management's target of 42% and much faster than the 18% achieved over FY07-10. This acceleration will be made possible by recent investments and Shoprite's commitment to expanding faster in Nigeria, according to Shoprite.

Zambeef has the opportunity to partner with Shoprite in other SSA countries, including Tanzania, DRC, Zimbabwe and Uganda (no agreement has been signed yet). This is not included in our model, but we think it could become a major opportunity for the Group over the medium-to-long term.

Figure 107: Zambeef in West Africa – historical and forecasts

	2007	2008	2009	2010	2011E	2012E	2013E
Revenue, ZMKmn	12,389	22,150	32,222	30,785	34,213	83,249	123,327
% growth		79%	45%	-4%	11%	143%	48%
% group turnover	4%	4%	4%	3%	3%	6%	8%
Nigeria, ZMKmn				18,885	21,718	57,009	95,775
YoY					15%	163%	68%
Butcheries and stores				2	2	5	8
Revenue/store, ZMKmn				9,443	10,859	11,402	11,972
YoY					15%	5%	5%
Ghana, ZMKmn				11,900	12,495	26,240	27,551
YoY					5%	110%	5%
Butcheries and stores				1	1	2	2
Revenue/store, ZMKmn				11,900	12,495	13,120	13,776
YoY					5%	5%	5%
Gross profit, ZMKmn	2,416	2,744	7,029	7,481	7,527	18,315	27,132
GP%	20%	12%	22%	24%	22%	22%	22%

Source: Company data, Renaissance Capital estimates

Group forecasts

Adjusted net profit to show 71% CAGR FY10-13E

Our estimate of a 71% CAGR for net profit implies a CAGR of 70% for EPS (including dilution from the acquisition). Our adjusted net profit forecasts have increased by c. ZMK6bn for FY11, and ZMK11-12bn for FY12 and FY13 compared to our previous expectations. The main reason for the better net profit forecasts is lower interest costs than previously expected as the acquisition of the Mpongwe was entirely financed by new equity while we had assumed that 50% would be financed by debt.

FY10 is adjusted for an FX loss of ZMK8bn (see P&L in Figure 113). Our FY11E forecasts are likely to include an FX gain (1H11 actuals included an FX gain of ZMK7.5bn.

This seems an ambitious growth target, but we have taken relatively cautious estimates on many aspects of our model:

- **Crops:** We assume lower yields than the historical levels of the existing business, and much lower gross margins than historical levels and management targets.
- We do not fully factor in the potential gains from **Novatek**'s new and much larger capacity. FY10 financials did not reflect the potential profitability of this plant.
- **Food production:** We forecast slight margin erosion in meat production, despite the potential efficiency gains that will come from the increased output at Novatek
- **Zammilk** has a promising outlook, in our view, and we think this segment could also surprise on the upside in terms of revenue growth and margins.
- **West Africa:** We factor in only half the potential of revenue growth from Shoprite's expansion plans

We regard our forecasts as conservative, as we seek to factor in downside risks beyond Zambeef's control (commodity prices, cattle diseases, FX rates, weather conditions) and the risks related to the proposed Mpongwe acquisition (delay in expansion or difficulties in financing it).

Our revised segment forecasts imply top-line growth of 14% in FY11, 20% in FY12 and 17% in FY13. Our gross margin forecasts come in at 34% in FY11, 39% for FY12 and 39% for FY13, with the increased contribution of crops the most important driver for margin expansion.

Our forecasts come in broadly in line with management guidance on the bottom line. The key differences between our view and management's are that we expect strong growth in the crops segment (a higher-margin business vs the Group average), strong margins at Zamanita (edible oils, which accounts for a large part of Group revenues), strong growth at Zammilk (a higher-margin business, but small) and strong growth in West Africa.

Figure 108: Segment historicals and forecasts

		2007-10	RC estimates 2010-13
Crops	Revenue CAGR	7%	70%
	Average gross margin	46%	38%
Edible oils	Revenue CAGR	41%	15%
	Average gross margin	19%	22%
Novatek	Revenues CAGR	47%	35%
	Average gross margin	19%	22%
Beef	Revenue CAGR	15%	7%
	Average gross margin	32%	30%
Chicken	Revenue CAGR	24%	14%
	Average gross margin	21%	22%
Pork (2008-2010)	Revenue CAGR	51%	18%
	Average gross margin	32%	30%
Milk	Revenue CAGR	14%	14%
	Average gross margin	61%	60%
West Africa	Revenue CAGR	35%	59%
	Average gross margin	20%	22%

Source: Company data, Renaissance Capital estimates

Our Group forecasts are lower than management guidance at the top-line level and higher at the gross margin level. We still regard our margin assumptions as cautious.

We forecast administrative expenses will increase 10% per year over FY11-13. Administrative expenses have typically grown slower than sales in the past and came down from 30% of revenues in FY06 to 23% in FY10. We forecast a gradual decline to 20% of sales by FY13. We forecast depreciation between 5% and 4% of sales over FY11 and FY13, broadly in line with company guidance. Our forecasts imply an EBIT margin of 7% in FY11E, rising to 14% in FY13E.

The acquisition has been priced at $47mn (ZMK229bn) and has been fully financed by a rights issue at ZMK2,975 per share. This led to an increase in the number of shares from 159mn to 248mn (89mn new shares).

We forecast a tax rate of 7% for FY11, rising gradually to 9% in FY13E. This is above the company guidance of a tax rate of 6% over the period, as Zambeef benefits from significant tax breaks for the large investments it has made over previous years (Zambian Development Agency Investment Promotion and Protection agreement signed in 2009).

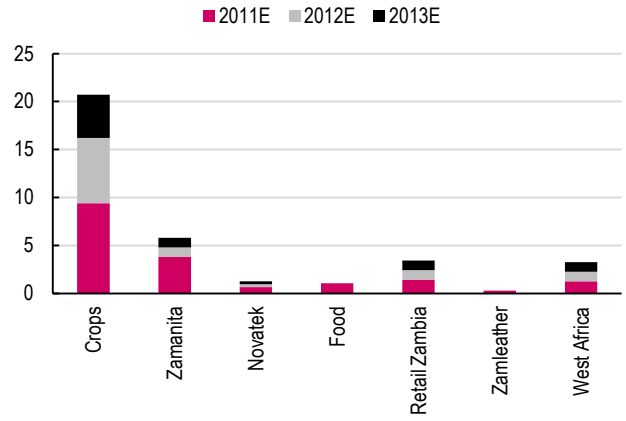
Figure 109: Renaissance forecasts for the Group, ZMKmn

	2011E	2012E	2013E
Group turnover	876,655	1,052,180	1,232,461
YoY	14%	20%	17%
Group gross profit	295,004	413,200	479,242
Margin	34%	39%	39%
EBIT	57,566	142,804	178,053
Adjusted net profit	46,065	120,308	151,077
Capex	85,860	49,328	38,064

Source: Company data, Renaissance Capital estimates

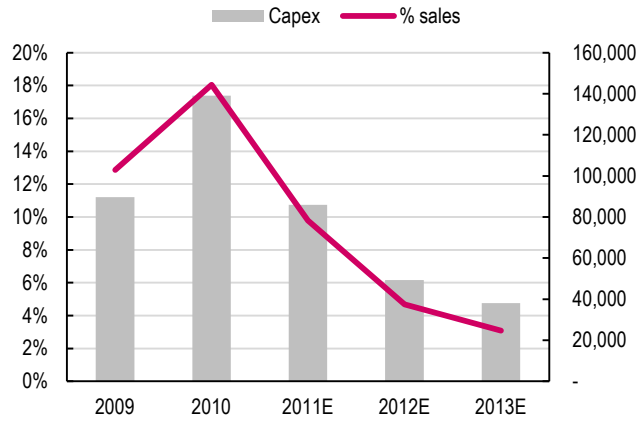
We forecast a dividend payout of 35% over FY11-13, in line with management guidance. Our forecast capex is based on management guidance and the recommendation of the Bosch report on the expansion of the Mpongwe farms (see previous section).

Figure 110: Zambeef's capex breakdown per segment, $mn



Source: Renaissance Capital estimates

Figure 111: Zambeef's capex progression, ZMKmn



Source: Renaissance Capital estimates

Impact of the Mpongwe acquisition and capital raising on Zambeef balance sheet and key ratios

- Zambeef's balance sheet is much stronger post the fund raising, with a net debt/EBITDA declining from 3.5x in 2010 to 2.4x in 2011. The EBITDA will improve by 55% YoY in 2011 from a relatively low base as Zambeef 2010 EBITDA was lower than Zambeef 2008 EBITDA. The EBITDA growth will be driven by operational improvements in Zambeef existing segments and the contribution of Mpongwe farms. The net debt will remain broadly in line – see detailed balance sheet forecasts below. Zambeef interest cover will increase to 7.2x in 2011 from 3.3x in 2010.

- Zambeef RoE will increase to 6% in 2011 from 4% in 2010 which remains well below historical levels (peak of 24% in 2006 down to 15% in 2007, 9% in 2008 and 4% in 2009).

- Zambeef calendarised P/E declines from 22.1x in 2010 to 13.7x in 2011.

P&L, balance-sheet and cash-flow forecasts

Figure 112: Key ratios

	2010	2011E	2012E	2013E
RoE	4%	6%	15%	16%
Net debt/EBITDA	3.50	2.40	0.90	0.30
Net debt/equity	48%	30%	21%	8%
Interest cover (EBIT/interests)	3.30	7.20	11.90	14.80
PE	24.1	16.1	6.2	4.9
Cal PE	22.1	13.7	5.9	4.8
Divi yield	2%	2%	6%	7%
EV/EBITDA	15.4	10.0	4.7	3.0
Cal EV/EBITDA	14.1	8.7	4.4	3.2
Adjusted net profit	29,985	46,065	120,308	151,077

Source: Company data, Renaissance Capital estimates

Figure 113: Zambeef consolidated P&L, ZMKmn

	2006	2007	2008	2009	2010	2011E	2012E	2013E
Net revenues	223,782	291,971	492,698	697,317	770,528	876,655	1,052,180	1,232,461
YoY		30%	69%	42%	10%	14%	20%	17%
Cost of sales	-123,350	-163,515	-301,817	-478,141	-526,561	-581,651	-638,980	-753,219
% of sales	-55%	-56%	-61%	-69%	-68%	-66%	-61%	-61%
Gross profit	223,782	291,971	492,698	697,317	770,528	876,655	1,052,180	1,232,461
Margin	45%	44%	39%	31%	32%	34%	39%	39%
YoY			49%	15%	11%	21%	40%	16%
Other operating income/costs	1,662	244	736	1,741	-1,533			
Administrative expenses	-68,044	-85,713	-123,899	-178,168	-179,990	-197,989	-217,787	-239,566
% of sales	-30%	-29%	-25%	-26%	-23%	-23%	-21%	-19%
YoY		26%	45%	44%	1%	10%	10%	10%
EBITDA	34,050	42,987	67,718	42,750	62,445	97,016	195,413	239,676
Margin	15%	15%	14%	6%	8%	11%	19%	19%
Depreciation	-10,092	-11,918	-19,039	-24,573	-28,683	-39,449	-52,609	-61,623
% of sales	-5%	-4%	-4%	-4%	-4%	-5%	-5%	-5%
Operating profit	23,958	31,069	48,679	18,177	33,761	57,566	142,804	178,053
Margin	11%	11%	10%	3%	4%	7%	14%	14%
Net exchange (losses)/gains			3,533	-66,519	-7,990			
Profit on disposal of investment/assets				65,790				
Finance costs	-2,509	-2,857	-8,018	-13,595	-10,236	-8,000	-12,000	-12,000
Profit before taxation	21,449	28,212	44,194	3,853	15,534	49,566	130,804	166,053
YoY		32%	57%	-91%	303%	219%	164%	27%
Income tax credit/(expense)	-1,784	-4,688	-5,919	12,164	4,286	-3,470	-10,464	-14,945
Tax rate	-8%	-17%	-13%			-7%	-8%	-9%
Profit after taxation	19,665	23,524	38,275	16,017	19,820	46,096	120,339	151,108
YoY		20%	63%	-58%	24%	133%	161%	26%
Profit attributable to equity holders	19,634	23,500	37,367	15,670	19,789	46,065	120,308	151,077
YoY		20%	59%	-58%	26%	133%	161%	0.26
Adjusted attributable profit	19,634	23,500	34,307	16,399	27,780	46,065	120,308	151,077
YoY		20%	46%	-52%	69%	54%	161%	26%
Dividend paid/(gross)	-8,500	-9,500	-13,600		-7,916	-16,123	-42,108	-52,877
Payout	-43%	-40%	-36%	0%	-40%	-35%	-35%	-35%

Source: Company data, Renaissance Capital estimates

Figure 114: Zambeef cash flows, ZMKmn

	2011E	2012E	2013E
EBIT	57,566	142,804	178,053
Tax on EBIT	-4,030	-11,424	-16,025
Tax rate	-7%	-8%	-9%
NOPAT	53,536	131,379	162,028
Depreciation	39,449	52,609	61,623
Change in working capital	-30,163	-26,329	-27,042
Capex	-85,860	-49,328	-38,064
Acquisition Mpongwe	-227,472		
Operating free cash flows	-23,037	108,331	158,545
Interest costs paid	-8,000	-12,000	-12,000
Adjustment in taxes	560	960	1,080
Dividend	-16,123	-42,108	-52,877
Capital raising	264,000		
Change in net debt (FCF)	-10,072	55,183	94,748

Source: Renaissance Capital estimates

Figure 115: Zambeef summary Group forecasts, ZMKmn

	2007	2008	2009	2010	2011E	2012E	2013E
Crops revenues	46,612	78,869	77,573	56,996	134,118	260,884	278,243
YoY		69%	-2%	-3%	135%	95%	7%
% group revenues	14%	13%	9%	6%	12%	18%	17%
Crops gross profit	25,507	43,156	28,617	21,997	46,941	104,354	111,297
margin	55%	55%	37%	39%	35%	40%	40%
% group gross profit	20%	23%	13%	9%	16%	25%	23%
Zamanita revenues		119,971	242,277	239,946	289,794	331,160	362,533
YoY			102%	-1%	21%	14%	9%
% group revenues		20%	28%	27%	26%	23%	22%
Zamanita gross profit		22,274	58,880	36,048	52,163	72,855	90,633
margin		19%	24%	15%	18%	22%	25%
% group gross profit		12%	27%	15%	17%	17%	19%
Novatek revenues	24,323	35,715	51,093	77,333	98,914	130,567	191,498
YoY		47%	43%	51%	28%	32%	47%
% group revenues	7%	6%	6%	9%	9%	9%	12%
Novatek gross profit	4,951	4,415	11,110	16,414	21,761	28,725	42,130
margin	20%	12%	22%	21%	22%	22%	22%
% group gross profit	4%	2%	5%	7%	7%	7%	9%
Beef revenues	134,930	166,222	224,729	202,895	202,895	223,692	246,620
YoY		23%	35%	-10%	0%	10%	10%
% group revenues	41%	28%	26%	23%	19%	16%	15%
Beef gross profit	47,065	61,589	60,222	63,320	60,869	67,108	73,986
margin	35%	37%	27%	31%	30%	30%	30%
% group gross profit	37%	32%	27%	26%	20%	16%	15%
Chicken revenues	43,318	51,425	59,504	83,382	96,306	111,234	122,635
YoY		19%	16%	40%	16%	16%	10%
% group revenues	13%	9%	7%	9%	9%	8%	8%
Chicken gross profit	12,439	11,303	5,185	20,978	21,187	24,471	26,980
margin	29%	22%	9%	25%	22%	22%	22%
% group gross profit	10%	6%	2%	9%	7%	6%	6%
Pork revenues		28,082	47,142	64,288	79,846	94,857	106,429
YoY		0%	68%	36%	24%	19%	12%
% group revenues		5%	5%	7%	7%	7%	7%
Pork gross profit		12,128	10,391	20,084	23,954	28,457	31,929
margin		43%	22%	31%	30%	30%	30%
% group gross profit		6%	5%	8%	8%	7%	7%
Milk revenues	28,797	32,202	40,789	42,572	49,282	57,051	62,898
YoY		12%	27%	4%	16%	16%	10%
% group revenues	9%	5%	5%	5%	5%	4%	4%
Milk gross profit	21,325	19,158	18,197	27,665	29,569	34,230	37,739
margin	74%	59%	45%	65%	60%	60%	60%
% group gross profit	17%	10%	8%	11%	10%	8%	8%
Zamflour + Zamloaf revenues	13,673	31,063	47,156	47,276	52,004	57,204	62,924
YoY		127%	52%	0%	10%	10%	10%
% group revenues	4%	5%	5%	5%	5%	4%	4%
Zamflour + Zamloaf gross profit	1,196	5,561	4,990	10,818	9,361	10,297	11,326
margin	9%	18%	11%	23%	18%	18%	18%
% group gross profit	1%	3%	2%	4%	3%	2%	2%
Zamchick Inn + Zamfish + Zamleather + Zamshu + Eggs revenues	24,707	26,615	37,218	47,239	55,238	61,946	66,726
YoY		8%	40%	27%	17%	12%	8%
% group revenues	8%	4%	4%	5%	5%	4%	4%
Zamchick Inn + Zamfish + Zamleather + Zamshu + Eggs gross profit	11,397	8,081	14,555	19,162	21,672	24,389	26,090
margin	46%	30%	39%	41%	39%	39%	39%
% group gross profit	9%	4%	7%	8%	7%	6%	5%
West Africa revenues	12,389	22,150	32,222	30,785	34,213	83,249	123,327
YoY		79%	45%	-4%	11%	143%	48%
% group revenues	4%	4%	4%	3%	3%	6%	8%
West Africa gross profit	2,416	2,744	7,029	7,481	7,527	18,315	27,132
margin	20%	12%	22%	24%	22%	22%	22%
% group gross profit	2%	1%	3%	3%	3%	4%	6%

Source: Renaissance Capital estimates

Valuation

We use a DCF- and multiples-based approach to determine a fair value range for the equity of Zambeef. Our peer group comprises other food companies listed in SSA, South Africa and developed markets. Our valuation range comes in between ZMK1,050bn and ZMK1,078bn, vs a current weighted market capitalisation of ZMK798bn.

Our valuation range implies a target price of ZMK4,289 (or GBP0.536) compared with a share price of ZMK3,000 in Lusaka and GBP0.50 in London.

Figure 116: Zambeef Summary valuation

TP ZMK	4,289
TP GBp	53.6
Upside/downside in Lusaka	43%
Upside/downside in London	7%
Weighted market cap	797,655
Vs April	101%
Number of shares Lusaka	194.3
Number of shares London	53.7

Source: Bloomberg, Renaissance Capital estimates

Peer valuation

Zambeef is currently more vertically integrated than most of the listed peers we have identified, and we think it could offer substantial upside potential in earnings from the benefits of the acquisition of Mpongwe farms, the turnaround of Zamanita and the ramp-up of Novatek.

SSA peers currently trade at an average P/E of 12x and EV/EBITDA of 6.1x for 2012, on our estimates (see below). Zambeef trades at calendarised 2012 multiples of 5.9x PE and 4.4x EV/EBITDA (based on Lusaka share price). Zambeef is trading at a 51% discount on a P/E basis and a 28% discount to an EV/EBITDA basis. However we would expect it to trade at a lower P/E given its lower tax rate (we forecast 7% for 2011). We only use EV/EBITDA multiples for our peer valuation. We emphasize that our forecasts for 2012 and beyond are dependent on the return on the acquisition and imply substantial growth in EBITDA and net profit.

In comparison, meat, poultry and grain producers from other South Africa and developed markets are currently trading at higher EV/EBITDA multiples but on slightly lower P/E multiples than our SSA peer group. Zambeef's strong growth prospects warrant a premium to SA and developed market producers, in our view, and we feel comfortable using the multiples of the SSA peer group to value the shares.

Figure 117: Valuation matrix

SSA food stocks	Bloomberg ticker	EV/EBITDA			P/E		
		2011E	2012E	2013E	2011E	2012E	2013E
Nestle Foods Nigeria PLC	NESTLE NL	15.1	14.7	11.5	25.2	25.4	19.3
Dangote Sugar Refinery PLC	DANGSUGA NL		2.0	1.8		5.3	3.2
Flour Mills of Nigeria PLC	FLOURMIL NL	3.4	2.8	2.4	9.1	6.7	8.0
Unilever Nigeria PLC	UNILEVER NL	10.9	9.3	7.4	19.6	17.7	14.2
PZ Cussons Nigeria PLC	PZ NL	10.5	10.8	8.2	16.3	20.4	12.5
Dangote Flour Mills PLC	DANGFLOU NL		2.2	3.0		2.7	4.8
UAC of Nigeria PLC	UACN NL	4.4	3.7		12.1	10.2	8.8
Innscor Africa Ltd	INAF ZH	5.0	2.8	2.4	11.1	7.3	6.3
Average		8.2	6.1	5.2	15.6	12.0	9.6
Zambeef – Lusaka shares		8.7	4.4	3.2	13.7	5.9	4.8
Discount to SSA food peers		6%	-28%	-39%	-12%	-51%	-50%
Zambeef – London shares		12.6	6.0	4.5	18.2	7.8	6.4
Discount to SSA food peers		53%	-2%	-15%	17%	-35%	-34%
Meat, poultry and grain producers							
Rainbow chicken	RBWJ.J	7.0	6.6	5.9	12.5	11.7	10.3
Astral foods	ARLJ.J	6.0	5.8	5.3	9.6	9.1	7.9
Chekizovo	GCHE.MM	6.2	5.3	4.9	5.7	4.9	4.5
Gruma	GRUMAB.MX	6.3	5.5	4.9	3.1	9.6	7.8
JBS	JBSS3.SA	9.4	7.1	6.3		17.4	11.3
BRF Brasil Foods	BRFS3.SA	10.9	9.9	8.5	18.2	14.1	12.4
Marfrig Alimentos	MRFG3.SA	7.2	5.9	5.0			18.9
Emerging markets meat and poultry producers		7.6	6.6	6.0	9.8	11.1	11.4
Tyson foods	TSN.N	4.8	4.7	4.3	10.1	9.6	8.3
Sanderson Farm Inc	SAFM.O		10.3	5.9		26.0	11.8
Pilgrim's Pride Corp	PPC.N		6.7	4.5		19.8	7.6
Developed markets food producers (excl SAFM.O)		4.8	7.2	4.9	10.1	18.5	9.2
Kernel	KERN.WA	5.8	5.2	5.3	6.4	6.0	5.8
SLC Agricola	SLCE3.SA	7.1	7.1	7.9	14.8	15.1	16.2
Adecoagro	AGRO.K	7.1	7.1	7.9	33.2	27.3	18.9
Emerging markets grain producers/farms		6.7	6.5	7.0	18.1	16.1	13.6
Bunge	BG.N	7.6	6.8	6.3	10.5	9.3	8.5
Grain corp	GNC.AX	7.1	7.2	8.1	9.7	10.0	12.1
Archer-Daniels-Midland Co	ADM	7.5	6.9	7.1	9.9	8.9	8.6
KWS Saat AG	KWSG.DE	6.6	6.1	6.0	14.3	13.2	13.0
Developed markets grain producers		7.2	6.8	6.9	11.1	10.4	10.6

Source: Reuters, Renaissance Capital estimates

We use the calendarised 2012E EBITDA data (6.1x multiple) to set the top of our valuation range of ZMK1,078bn for the equity of Zambeef, compared with a current market value of ZMK798bn. This gives us a fair value per share of ZMK4,345.

Figure 118: Multiple-based valuation

2012E EV/EBITDA	6.1
2012E EBITDA (ZMKmn)	206,478
EV Fair value	1,250,460
Net debt	172,933
Equity fair value	1,077,527
Shares in issue (mn)	248
Fair value per share (ZMK)	4,345
Upside	45%

Source: Renaissance Capital estimates

DCF valuation

We estimate the cost of equity of Zambeef at 24%, based on a risk-free rate of 15% (10-year Zambian government bond yield), a market risk premium of 5%, and estimated beta of 1.7. The after-tax cost of debt is 7%, and our WACC comes in at 18%. These numbers are in-line with our previous estimates (before the fund raising). We however change our long-term growth rate to 5% from 3% which we think was too low.

Our DCF fair value comes in at ZMK1,050bn and at ZMK4,233 per share. Figure 114 shows the breakdown of our DCF calculations. Figure 121 sets out our cash-flow forecasts.

Figure 119: WACC calculations

Risk-free rate	15%
Market risk premium	5%
Beta	1.70
Cost of equity	24%
Cost of debt after tax	7%
WACC	18%
D/E	50%
Long-term growth rate	5%

Source: Renaissance Capital estimates

Figure 120: DCF summary, ZMKmn

Sum of discounted operating cash flows	560,666
Discounted terminal value	466,670
EV	1,027,336
Net debt 1H11	232,703
Equity value, ZMKmn	1,049,806
Equity value per share	4,233
Upside	41%

Source: Renaissance Capital estimates:

Figure 121: DCF, ZMKmn

	Sep-12	Sep-13	Sep-14	Sep-15	Sep-16	Sep-17	Sep-18	Sep-19	Sep-20
Operating FCF	108,331	158,545	187,641	203,234	216,944	233,551	245,083	257,941	264,674
YoY	NA	46%	18%	8%	7%	8%	5%	5%	3%
discount rate	86%	73%	62%	52%	44%	37%	31%	27%	22%
Discounted cash flows	93,252	115,332	115,350	105,580	95,241	86,646	76,838	68,340	59,260
Terminal value									2,084,308
Discounted terminal value									466,670
EV									1,282,509
Net debt 1H11									232,703
Equity value (ZMKmn)									1,049,806
Per share									4,233
Upside/Downside to current share price in Lusaka									41%

Source: Renaissance Capital estimates:

Comparison with our previous valuation range

We previously (April 2011) valued Zambeef equity between ZMK628-782bn. This was an equity range based on a DCF method and a 2011E EV/EBITDA (calendarised) multiple-based method. This valuation range was post-money and acquisition (including a fund raising to pay for the acquisition and including the benefits of the Mpongwe acquisition). That average of that range implied fair value per share of ZMK4,434 before dilution (number of shares of 159mn). That compared with a price of ZMK2,505 in end-March 2011.

For our revised valuation we use 2012 multiples as opposed to 2011 multiples (as we near 2011 year-end). Our 2012 estimates imply substantial growth in EBITDA and net income, which explains the higher valuation. But we emphasize that our forecasts for 2012 and beyond are dependent on the return on the acquisition. Our revised fair value range is ZMK1,050-1,078bn. If we compare our EV/EBITDA based valuation (ZMK1,078bn) with our previous estimate (using 2012) it is 5% lower. Compared to our previous valuation, our DCF fair value increased by 67% (due to

time value and long-term growth rate). We do not use the P/E-based valuation for our fair value range and target price calculation (see above).

This improvement in the valuation range is not quite sufficient to offset the 56% dilution of the capital raising (56% increase in the number of shares). Our new range of ZMK1,050-1,078bn implies a target price of ZMK4,289/share post dilution (number of shares of 248mn). This is a 3% decline from the target price implied by our previous estimate. If we use the previous valuation range (but using 2012 multiples based value of ZMK1,139bn) and the new number of shares, this implies an average fair value per share of ZMK3,563. The improvements on the P&L and balance sheet add ZMK588 per share (not accounting for change in long-term growth rate).

Our TP of ZMK4,289 implies 43% potential upside to the Lusaka share price therefore **we place a BUY rating on Lusaka-listed shares**. Our TP in GBP is 53.6 which is 7% above Zambeef's share price on AIM (GBP50) which is at a premium to those in Lusaka (33%). **Therefore we place a HOLD rating on shares listed on AIM.**

Sensitivity of our valuation to our key assumptions for Crops and Zamanita

- We make conservative assumptions on the output of Zambeef's existing farms: For FY11 we assume only 40kt and for FY12E-13E we forecast 45kt vs a peak of 65kt in FY09 and an average of 51.667kt between FY07-09.

- We use a 40% gross margin vs an historical average of 46% for Zambeef's existing farms and management forecasts of 54% for the Mpongwe farms. For FY11 we have lowered our margin assumption to 35% based on low profitability in 1H11.

There could be substantial upside potential to our DCF- and multiples-based valuation if we were to change these assumptions (for FY12 onwards). With 65kt at Zambeef's existing farms and a gross margin of 46%, the DCF fair value would come in 18% higher at ZMK1,242bn and our 2012E (calendar) EV/EBITDA-based fair value would be 22% higher at ZMK1,313bn.

Zambeef's existing farms have been improved and the area under irrigation expanded over the years, so we would not be surprised to see these farms reaching a much higher output than our base-case forecast of 40kt. We have remained cautious on output and margins, to factor in weather-related risk. If this risk does not materialise, the crops segment's results are likely to beat our forecasts.

Figure 122: DCF fair value sensitivity to our assumptions in the crops division

		Gross margin in the crops division						
		34%	36%	38%	40%	42%	44%	46%
Cereal output in Zambeef's exiting farms	15,000	846,074	868,743	891,413	914,083	936,753	959,422	982,092
	25,000	884,529	909,460	934,392	959,324	984,256	1,009,188	1,034,119
	35,000	922,984	950,177	977,371	1,004,565	1,031,759	1,058,953	1,086,147
	45,000	961,438	990,894	1,020,350	1,049,806	1,079,262	1,108,718	1,138,174
	55,000	999,893	1,031,611	1,063,329	1,095,047	1,126,765	1,158,483	1,190,201
	15,000	1,038,348	1,072,328	1,106,308	1,140,288	1,174,268	1,208,248	1,242,228
	25,000	1,076,803	1,113,045	1,149,287	1,185,529	1,221,771	1,258,013	1,294,255

Source: Renaissance Capital estimates

Figure 123: EV/EBITDA fair value sensitivity to our assumptions in the crops division

		Gross margin in the crops division						
		34%	36%	38%	40%	42%	44%	46%
Cereal output in Zambeef's exiting farms	15,000	828,108	854,901	881,694	908,486	935,279	962,072	988,864
	25,000	876,003	905,613	935,223	964,833	994,443	1,024,054	1,053,664
	35,000	923,898	956,326	988,753	1,021,180	1,053,608	1,086,035	1,118,463
	45,000	971,793	1,007,038	1,042,283	1,077,527	1,112,772	1,148,017	1,183,262
	55,000	1,019,688	1,057,750	1,095,812	1,133,874	1,171,937	1,209,999	1,248,061
	15,000	1,067,583	1,108,463	1,149,342	1,190,221	1,231,101	1,271,980	1,312,860
	25,000	1,115,478	1,159,175	1,202,872	1,246,568	1,290,265	1,333,962	1,377,659

Source: Renaissance Capital estimates

We have also made relatively conservative assumptions for the recovery of margins at Zamanita: at 18% in FY11E, rising to 25% by FY13E. The margin at Zamanita was 19% in FY08 and 24% in FY09, despite a limited intake of soya beans. The drop in Zamanita's margins to 15% in FY10 was due to the limited soya intake, adverse price progressions, an increase in import duties on palm oil as well as losses on forward contracts for soya beans and soya cake. We have been cautious on margins to factor in the risk of volatility in soya prices and potential losses on hedging. However, management has commented that hedges on soya beans for Zamanita were now covered by forward soya cake sales (excluding sales to Novatek). Also the larger proportion of Zamanita's output going to Novatek's production will provide some protection, assuming Novatek has better pricing power than Zamanita. The sensitivity analysis below shows the impact on our DCF and multiples-based fair value if the margin in FY12 is different from our assumption of 22% (after FY12 we see it rising by 3 ppts in FY13 [base case 25%]).

We assume Zamanita will be able to purchase 45kt of soya beans in FY12 and 15kt more in FY12 (the additional production from Mpongwe farms). The level of soya bean intake is a key driver of Zambeef's revenue growth in edible oils and other segments higher in the value chain, and therefore the impact on our valuation for the Group.

If Zambeef was able to secure 55kt of soya beans in FY12 and Zamanita's margin was 2 ppts higher than our base-case forecasts, our DCF and multiples-based fair values would increase 4% and 7%, respectively.

Figure 124: DCF fair value sensitivity to our assumptions for Zamanita

			Gross margin of Zamanita						
			19%	20%	21%	22%	23%	24%	25%
Soya beans intake in FY12 (FY13 is the same +15kt)	45kt in FY12E	15	950,099	954,210	958,320	962,430	966,540	970,650	974,760
	60kt in FY13E	25	978,313	982,727	987,141	991,555	995,970	1,000,384	1,004,798
	70kt in FY14E	35	1,006,526	1,011,244	1,015,962	1,020,681	1,025,399	1,030,117	1,034,836
		45	1,034,739	1,039,761	1,044,784	1,049,806	1,054,829	1,059,851	1,064,874
	55kt in FY12E	55	1,062,952	1,068,278	1,073,605	1,078,932	1,084,258	1,089,585	1,094,911
	70kt in FY13E	65	1,091,165	1,096,796	1,102,426	1,108,057	1,113,688	1,119,318	1,124,949
	80kt in FY14E	75	1,119,378	1,125,313	1,131,248	1,137,182	1,143,117	1,149,052	1,154,987

Source: Renaissance Capital estimates

Figure 125: EV/EBITDA fair value sensitivity to our assumptions for Zamanita

			Gross margin of Zamanita						
			19%	20%	21%	22%	23%	24%	25%
Soya beans intake in FY12 (FY13 is the same +15kt)	45kt in FY12E	15	934,500	952,835	971,171	989,506	1,007,842	1,026,178	1,044,513
	60kt in FY13E	25	959,665	979,392	999,119	1,018,847	1,038,574	1,058,301	1,078,029
	70kt in FY14E	35	984,830	1,005,949	1,027,068	1,048,187	1,069,306	1,090,425	1,111,544
		45	1,009,995	1,032,506	1,055,017	1,077,527	1,100,038	1,122,549	1,145,060
	55kt in FY12E	55	1,035,160	1,059,063	1,082,965	1,106,868	1,130,770	1,154,673	1,178,576
	70kt in FY13E	65	1,060,325	1,085,620	1,110,914	1,136,208	1,161,502	1,186,797	1,212,091
	80kt in FY14E	75	1,085,490	1,112,176	1,138,862	1,165,548	1,192,235	1,218,921	1,245,607

Source: Renaissance Capital estimates

Figure 126: DCF sensitivity to our WACC and LT growth rate assumptions

		LT growth rate						
		2%	3%	4%	5%	6%	7%	8%
WACC	19.8%	842,225	863,374	887,195	914,228	945,169	980,932	1,022,740
	19.3%	877,010	900,187	926,388	956,245	990,581	1,030,484	1,077,429
	18.8%	913,937	939,386	968,267	1,001,323	1,039,531	1,084,196	1,137,108
	18.3%	953,207	981,207	1,013,113	1,049,806	1,092,449	1,142,617	1,202,495
	17.8%	995,043	1,025,915	1,061,250	1,102,092	1,149,838	1,206,397	1,274,461
	17.3%	1,039,698	1,073,815	1,113,048	1,158,645	1,212,287	1,276,312	1,354,057
	16.8%	1,087,461	1,125,254	1,168,938	1,220,004	1,280,498	1,353,296	1,442,576

Source: Renaissance Capital estimates

Agriculture
Sub-Saharan Africa / Zimbabwe

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- **Dominant seed producer in Southern Africa.** Seed Co is the biggest seed house in Zimbabwe (70% market share), Zambia (50%) and Malawi (50%). We think its strong research capabilities, its growing reputation and knowledge of Africa markets will aid its expansion ambitions into the rest of Africa.
- **We think East Africa will be the Group's next growth hub.** These are potentially much bigger than Seed Co's existing markets. Seed Co is already selling in this region (8-10kt) and has recently commenced local production. In Kenya it is only selling seed suitable for lowland areas but the real growth opportunity lies in the highlands market (35kt in size vs 8kt for lowlands). Research work on a suitable variety is ongoing and management expects the first varieties to be commercialised soon. Collaboration work with research institutions in West Africa is gathering steam and we view this market as a medium- to long-term opportunity.
- **Catalysts for margin growth.** We see upside to EBITDA margins coming from economies of scale, localised production in East Africa, enhanced processing capabilities, and ongoing development of higher quality seed varieties. We also think a potential alliance with Monsanto will help it keep abreast of modern developments and should prepare it for when GMO (genetically manufactured organisms) seed comes to Africa.
- **We see upside risks to our forecasts**. Potential catalysts that we have not accounted for include: 1) quicker expansion into West Africa; 2) introduction of GMO seed; 3) expansion of cotton seed business; and 4) a sooner-than-expected improvement in Zimbabwe's economic and political landscape. While we think upside risks are higher, potential downside risks include liquidity constraints in Zimbabwe, credit risk and FX risk.
- **We initiate coverage of Seed Co with a HOLD rating and TP of $1.10/share.** Our TP is derived from multiples-based and DCF valuations and is in line with Seed Co's current share price of $1.07 (as of 16 November). It is trading at a premium to its peers – 4% on 2012 P/E and 6% EV/EBITDA, on our estimates.

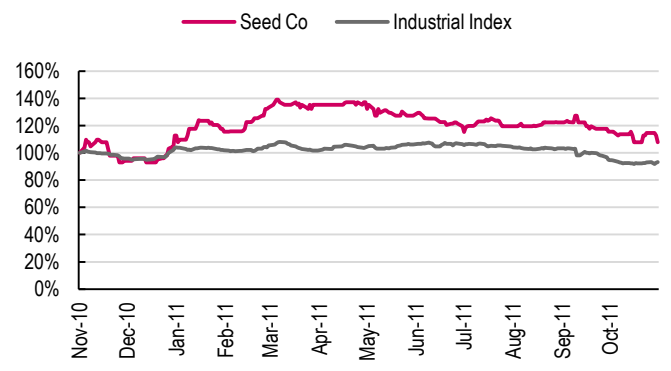
Report date:	**21 November 2011**
Rating common/pref.	**HOLD**/na
Target price (comm), $	1.10
Target price (pref), $	na
Current price (comm), $	1.07
Current price (pref), $	na
MktCap, $mn	211.5
EV, $mn	229.4
Reuters	SEED.ZI
Bloomberg	SEEDCO ZH
ADRs/GDRs since	na
ADRs/GDRs per common share	na
Common shares outstanding, mn	192.3
Change from 52-week high:	-24.6%
Date of 52-week high:	17/03/2011
Change from 52-week low:	12.6%
Date of 52-week low:	30/12/2010
Web:	www.seedco.co
Free float in $mn	80
Major shareholder	AICO Africa
with shareholding	51%
Average daily traded volume in $mn	0.09
Share price performance	
over the last 1 month	-7.0%
3 months	-12.3%
12 months	-2.7%

Summary valuation and financials, $mn

	Revenue	EBITDA	Net income	EPS, $	DPS, $	EBITDA margin, %	EV	Net debt	EV/Sales	EV/CF	EV/EBITDA	P/E	P/B	Div yield, %	RoAE, %
2010	92.6	26.1	16.3	0.09	0.01	28.1%	217.7	12.0	2.42	11.61	8.58	12.58	3.06	0.5%	8.5%
2011E	114.4	31.8	18.2	0.09	0.02	27.8%	229.2	23.5	1.96	4.30	7.04	11.29	2.59	2.3%	7.5%
2012E	132.2	37.6	21.8	0.11	0.04	28.4%	227.1	21.3	1.69	2.02	5.95	9.44	2.18	3.5%	7.1%
2013E	151.8	46.2	27.9	0.15	0.05	30.4%	216.9	11.1	1.47	1.41	4.84	7.38	1.82	4.5%	7.4%

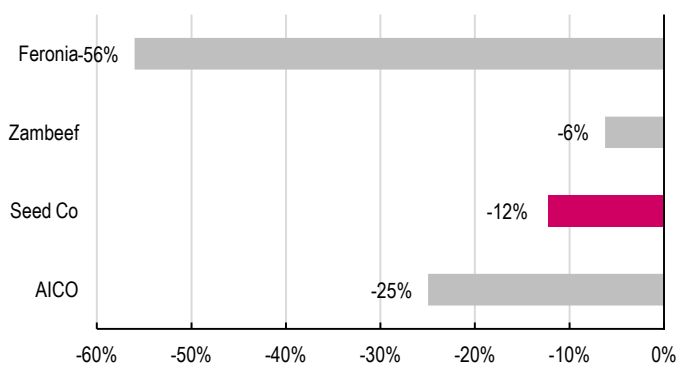
Source: Renaissance Capital estimates

Figure 127: Price performance – 52 weeks



Source: Zimbabwe Stock Exchange

Figure 128: Sector stock performance – 3 months



Source: Zimbabwe Stock Exchange, Bloomber

Investment summary

We think Seed Co offers exposure to the potential growth in Africa's agricultural sector. This sector is underinvested but the continent's abundant resources and climatic advantages are supportive of growth in the future. We think penetration of the seed market is still relatively low, particularly in East and West Africa, and the opportunity for improved seed is significant.

Seed Co has a strong foothold in Southern Africa with leading market share in Zimbabwe, Zambia and Malawi. Its research capabilities are the cornerstone of its success and going forward this should be helped by enhanced marketing and sales focus. We think Seed Co's growing reputation and knowledge of Africa markets will aid its expansion ambitions into East and West Africa. We see upside to margins coming from economies of scale, localised production in East Africa, enhanced processing capabilities, and ongoing development of higher quality seed varieties. We also think a potential alliance with Monsanto will help them keep abreast of modern developments and should prepare them for when GMO seed comes to Africa.

We forecast top-line growth of 14.8% CAGR (over FY11-16E) and EBITDA and net income growth of 19%and 19.8%, respectively. We highlight the upside risks to our estimates. Potential catalysts that we have not accounted for include: 1) quicker expansion into West Africa; 2) introduction of GMO seed; 3) roll-out of cotton seed business into other countries; and 4) a sooner-than-expected improvement in Zimbabwe's economic and political landscape.

We initiate on Seed Co with a **HOLD** rating and TP of $1.10/share. This is based on an average of multiples-based and DCF valuations which give a range of $192-$248mn. Seed Co is trading at a premium to its peers (international agricultural comps) on a 2012 P/E and EV/EBITDA basis of 4% and 6%, respectively, on our estimates.

Figure 129: Seed Co fair value per share ($)

DCF fair value	1.27
2012e PE based fair value	1.03
2012e EV/EBITDA based fair value	1.00
Seed Co TP	**1.10**
Current share price	1.07
Potential upside/(downside)	**3%**

Source: Renaissance Capital estimates

We think the upside risks to our forecasts are higher but we highlight the potential downside risks:

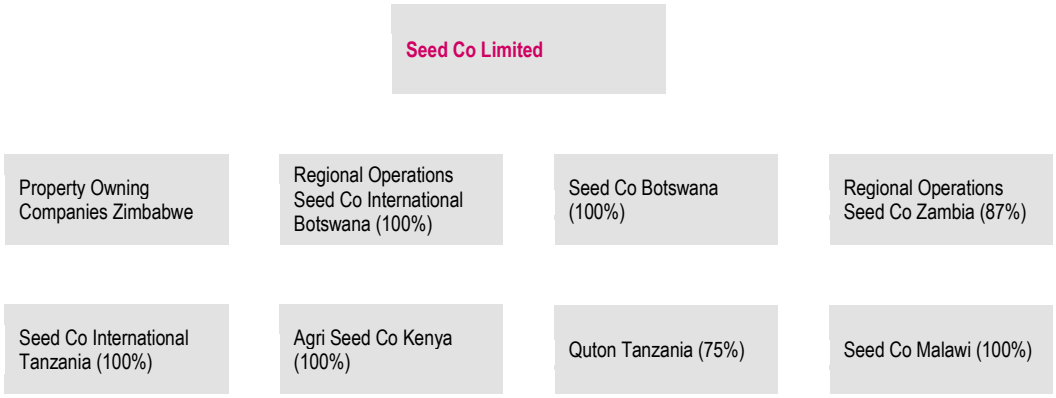
- Liquidity constraints in Zimbabwe – our sales forecasts are relatively cautious, reflecting some level of risk.
- Credit risk – government is a major buyer in some markets (Zimbabwe, Zambia, Malawi).
- FX risk – currency depreciation in Malawi is a concern.
- High carryover stock and working capital constraints – however we think cash generation will be strong and accessibility to borrowings will be sufficient to fund it.

Company overview

Seed Co Limited is a producer, marketer and retailer of certified crop seeds in Africa. It listed on the Zimbabwe Stock Exchange in 1996 and AICO Africa (also listed) owns a 51% stake. Most of its cereals and oil crop seed varieties are proprietary, and developed and bred at its own research stations, and seed is produced from its own parent seed under contract by an established producer network. Hybrid maize seed comprises the bulk of the Group's sales (traditionally 65-70% of revenue); other seed varieties include wheat, soya bean, and cotton seed (which together account for approx 20-30%), as well as barley, sorghum and ground nut seed.

Seed Co is the largest seed house in Zimbabwe (70% market share), Zambia (50%), and Malawi (50%), and it also has operations in Botswana and East Africa (46% share in Tanzania and 10% in Kenya). Its subsidiary Quton (75% owned) focuses on cotton seed production. Currently Seed Co supplies seed to a total of 13 African countries.

Figure 130: Group structure



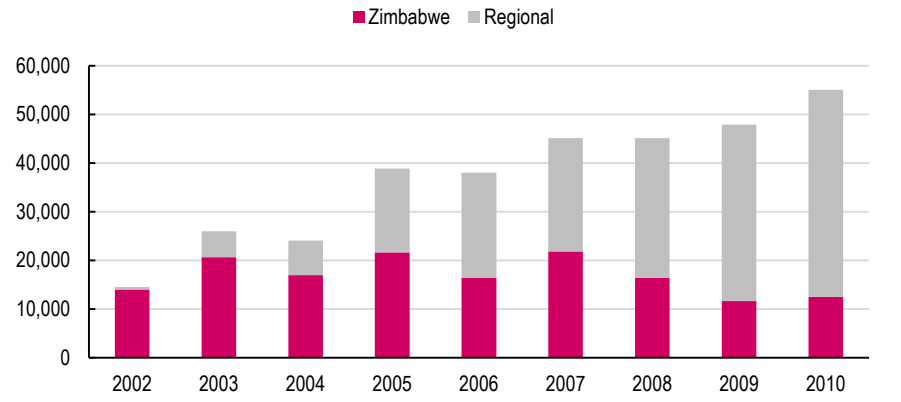
Source: Company website

Growth has been driven by dollarisation of the Zimbabwe economy, as well as expansion of regional operations

The dollarisation of the Zimbabwean economy brought some stability to the business sector and Seed Co benefited from better seed pricing which was the key driver of revenue – Zimbabwe turnover increased four times in FY10 relative to FY09. Better pricing has also encouraged higher production volumes – maize seed production increased 166% in FY11 vs FY10 in Zimbabwe.

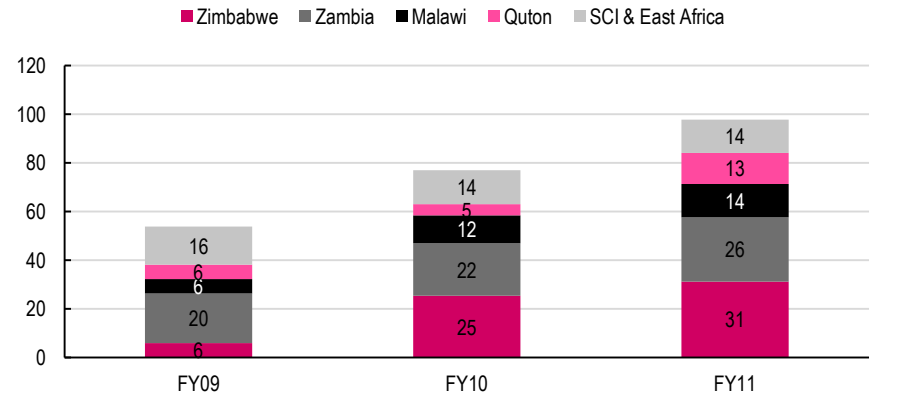
Seed Co was established in Zimbabwe but over the years it has been expanding its production and sales into other African countries in its drive to become a major player in the African seed market. Figure 131 shows how its maize sales volumes have progressed in the region.

Figure 131: Hybrid maize sales volumes, Zimbabwe vs regional, tonnes



Source: Company data

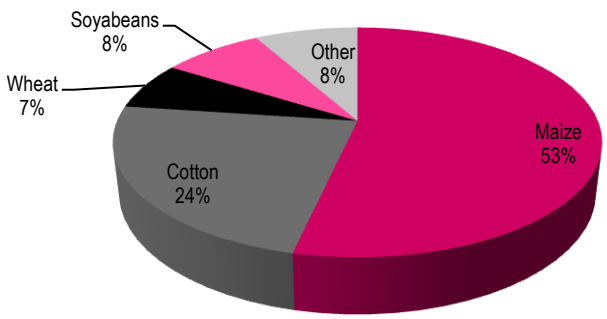
Figure 132: Revenue split by region, $mn



Source: Company data

Maize seed traditionally accounts for 65-70% of Seed Co's sales. Demand for maize seed is more stable because of repeat buying (it can be retained at most once due to its short life span). Soya on the other hand is an open-pollinated variety for which retention rates are higher. The proportion of maize seed in FY11 was lower due to a rebound in cotton seed demand.

Figure 133: FY11 sales volumes split by seed type



Source: Company data

Outlook

We see significant growth potential for this group and we highlight some positive trends in the sector, together with Seed Co's competitive advantages, which we think combined, could lead to strong performance.

Investment case

Potential for significant growth in SSA agriculture

Despite abundant agricultural land in Africa, most countries suffer from large food deficits due to underinvestment in the sector. There is a growing emphasis on the continent to achieve food self-sufficiency and given the increased support from governments and food agencies we think Seed Co is well placed to benefit from growing demand for seed. The global hybrid market is estimated at $30bn worldwide and Africa has a penetration rate of only 23%, with most countries not using any hybrid seeds (according to management).

Penetration of East and West Africa markets still relatively low

Seed markets in Southern Africa are much more developed and competition much more intense. Seed Co has dominant market share in Zimbabwe (70%), Zambia (50%) and Malawi (50%). Major competitors include Pannar, Pioneer, and Monsanto.

Figure 134: Market share data by country (FY11 data)

Zimbabwe		Zambia		Malawi		Tanzania	
Seed company	%	Seed company	%	Seed company	%	Seed company	%
Seed Co	70%	Seed Co	50%	Seed Co	50%	Seed Co	46%
Pannar	10%	MRI	17%	Monsanto	23%	Pannar	9%
Pioneer	8%	Zamseed	15%	Demeter	19%	Monsanto	9%
Other	12%	Pannar	12%	Other	8%	Pioneer	6%
		Pioneer	3%			Other	30%
		Monsanto	3%				

Source: Company data

East Africa is the next growth hub for Seed Co, in our view. Whilst Seed Co is already selling to these regions (8-10kt), production has only recently commenced and this should benefit profitability with savings coming through elimination of transport costs and agency costs. Seed Co has dominant share of the Tanzania market in hybrid maize seed (46%) and an exclusive contract to supply cotton seed for the next seven years. Seed Co has also recently set up a small processing plant in Ethiopia following a successful pilot production (achieving yields of 4.5t/ha). The scope for growth in these markets is significant; management estimate the market size for hybrid seed is 41kt in Kenya and 44kt in Ethiopia. In Kenya Seed Co is only selling seed suitable for lowlands, which is less than a quarter the size for highlands seed. Research work on a suitable variety is ongoing and management expects the first varieties to be commercialised soon.

We view West Africa as a medium- to long-term opportunity. Collaboration work with research institutions (IITA and Cymmty) in West Africa is gathering steam and in the medium- to long-term this could potentially be a big market for Seed Co. We note that Seed Co has developed a strong foothold in the Africa space, particularly Southern Africa. We believe it understands how to operate in Africa, and this together with its growing reputation will aid its expansion ambitions. Given uncertainty on the timeline we exclude this market from our forecasts.

Upside to sales in Zimbabwe

The recovery in seed production in Zimbabwe has been impressive, but sales have not grown at the same pace, we think due to low liquidity and lack of funding for small-scale farmers. This last season the Group built up significant reserves (we estimate 10kt). Having received approval to export excess seed, we think Seed Co will be able to use the reserves to meet demand in other markets if need be. Going forward we expect a gradual improvement in sales in Zimbabwe together with increased production in other markets (mostly East Africa) – this should be very positive for sales volume growth.

Performance driven by research capabilities

Seed Co has six research centres across Africa – three in Zimbabwe, two in Zambia and one in Kenya (newly acquired). Seed Co attributes its success to its innovation and new product advancement, and in FY11 investment in R&D was up 124% to $3.2mn (3.3% revenue vs 1.9% in FY10). New processing capabilities are helping to reduce release periods, and the group has achieved a constant rise in production quality and genetic purity of all seeds – this is positive for the price mix. In FY11 the group released five new cultivars characterised by high-yield potential and stability. We see a huge opportunity for improved seed in Africa given the positive attributes being achieved and how these would benefit agricultural development (drought resistant, high yield).

Preparing for GMO production

There is a huge opportunity in GMO seed which is not yet used commercially in Africa, outside South Africa. A number of countries allow GMO production trials under supervision, and it is believed that acceptance is growing and commercial use is imminent. The impact this could have on yields is significant. For example we believe GMO cotton seed can allow for a doubling of yields. Seed Co is pursuing alliances with Monsanto to keep abreast of modern developments in breeding technology such as introduction of GMO traits. A technological transfer agreement is expected to be finalised soon.

Development of cotton seed business

In FY11 there was a notable increase in demand for cotton seed in Zimbabwe. In Tanzania, Seed Co has secured an exclusive contract to supply cotton seed for seven years (through its subsidiary Quton Tanzania). Production in Tanzania is expected to reach 1.3kt in FY12 and 7kt in FY13 (management guidance). Plans are also under way to set up a cotton multiplication business in Malawi, and Zambia has also expressed interest (our forecasts do not take into account these potential new markets).

Upside to operating margins

Gross margins recovered 8 ppts in FY11 to 51% due to production efficiencies and lower production costs. This is where margins should be according to management but we think there is some upside potential as seed varieties continue to improve. Looking at comparable companies such as Monsanto, Syngenta and KWS Saat, 50% and above appears to be the industry standard.

However, we see the most upside at the EBITDA level, and we think this uplift will come from:

- Regional expansion – As the Group scales up production in new markets we expect to see benefits from economies of scale.

- Savings from localised production – Production in East Africa will save on transport and agency costs (seed previously transported from Zambia). Management estimate transport costs were $230/t.

- Consolidation of Zambia operations – Processing and storage of seed will be centralised which should save on transport and storage costs, thus enhancing operational efficiencies.

- Better processing technologies – A new plant was commissioned in Zambia in July 2011 and another facility is under construction in Malawi. A new acid de-linting plant has been ordered for Quton Tanzania and a small plant has been established in Ethiopia to process current production.

- New and improved seed varieties – Seed Co's research functions continue to work on improving existing seed varieties and adopting new breeding techniques. The Group has six research centres located in Zimbabwe, Zambia and Kenya and in FY11 five new seed varieties were released (high yielding maize and wheat, and three red leaf blotch resistant soya bean varieties).

- Potential introduction of GMO traits – If commercial use of GMO seed is accepted, and Seed Co reaches an agreement with Monsanto, we expect both partners will share in the uplift in profitability.

Drought conditions in Kenya and elections in Southern Africa promoting demand

Management expects that successive droughts in Kenya and lack of reserves will support demand this season. Dry conditions in Zimbabwe earlier in the year may also support stronger demand this season (although we believe funding is the key constraint). In the run-up to elections, we tend to see increased spend by governments on food programmes and we expect this may have stimulated higher demand in Zambia and Malawi this year. In 2012 or 2013 this might be a catalyst for sales growth in Zimbabwe.

Enhanced marketing and sales efforts

Management is focused on strengthening its marketing functions and improving its distribution channels. In the past expenditure on this function has been low, with all attention on production. In FY11 investment in branding and marketing was up 65% and new managers were appointed in Zimbabwe, Zambia and Malawi.

Seed Co has access to cheap borrowings

Seed Co's averaging borrowing costs are 13% in Zimbabwe but between 5% and 7% in other regions. Management does not anticipate additional financing requirements for the Zimbabwe business which is highly cash generative. Capital expenditure will only be required for expansion activities and Seed Co has access to finance outside Zimbabwe at relatively cheap rates. In the past, it has been able to raise borrowings through its Botswana subsidiary at rates of about 5%.

Downside risks

Constrained liquidity in Zimbabwe

Whilst production has rebounded strongly, liquidity and funding of agriculture remain the key constraints. There is significant upside for sales growth if funding for the sector improves, and at more affordable rates. Political instability continues to discourage FDI which impacts on liquidity in the economy and banking sector, and absence of long term leases on land restricts banks' willingness to lend. Management has said that the grower base may need to be rationalised depending on the uptake of seed this season. While current indications are for strong demand it still expects to carryover stock into FY13. It is likely it will scale down production next year to eat into stocks. We expect a gradual pick-up in sales and we think maize seed production in Zimbabwe will actually decline on average over FY12-16 (14.7% CAGR).

Credit risk

The government is a major customer, particularly in Zimbabwe, Zambia and Malawi. Challenging environments in Zimbabwe and Malawi, in particular, increase the risk of default. In FY11 full provision was made for credit losses of amounts due from the Reserve Bank of Zimbabwe. FY11 trade receivables were up $14.3mn vs FY10 but amounts owed by the Malawian and Zambian governments were expected to be paid after YE ($30mn has subsequently been collected).

Higher funding costs for carryover seed

Inventories grew 95% YoY in FY11 (and 121% in 1H12) as a result of the carryover stock accumulated in Zimbabwe. While this may give the Group a strategic advantage going into the next season, it will require funding. The Group's cash cycle increased from 169 days in FY10 to 282 days in FY11 (on our estimates), and short-term borrowings increased to $23mn (from $3.6mn) to fund the increased production. While this is a risk, we think cash generation will remain strong and sufficient borrowings can be accessed to finance the carryover (without a significant deterioration in interest cover). We also think future production in Zimbabwe will slow as a result of the excess supply.

Foreign exchange risk

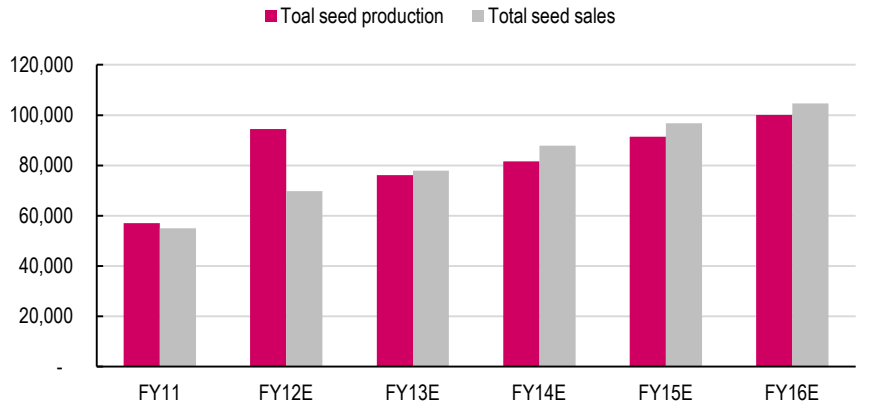
With operations in a number of countries, Seed Co is exposed to foreign exchange risk. Malawi in particular is a concern given the level of currency depreciation.

Financial forecasts

Maize seed sales to drive the top line

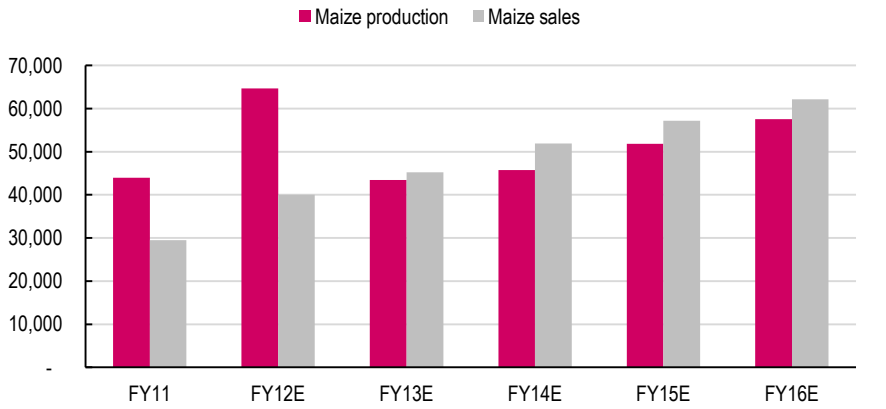
We forecast total volumes produced will grow at 11.9% CAGR over FY11-16E and sales will grow at 13.7% CAGR. We expect that hybrid maize will continue to drive volumes, accounting for 59% of sales in FY16; however we think production will significantly lag sales. We expect production and sales CAGRs of 5.5% and 16.1%, respectively. The following charts give a breakdown of our forecasts by seed type and location.

Figure 135: Production vs. sales forecasts for total seed volumes, tonnes



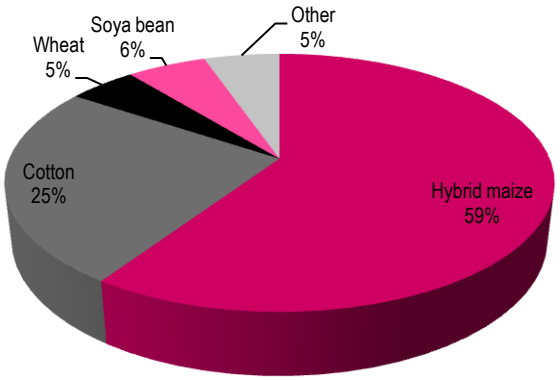
Source: Company data, Renaissance Capital estimates

Figure 136: Production vs. sales forecasts for hybrid maize seed volumes, tonnes



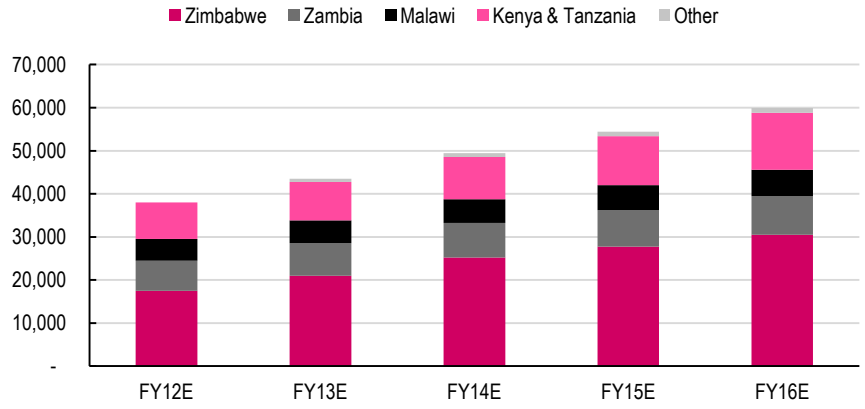
Source: Company data, Renaissance Capital estimates

Figure 137: Sales split by seed type for FY16



Source: Renaissance Capital estimates

Figure 138: Maize seed sales forecasts by location, tonnes



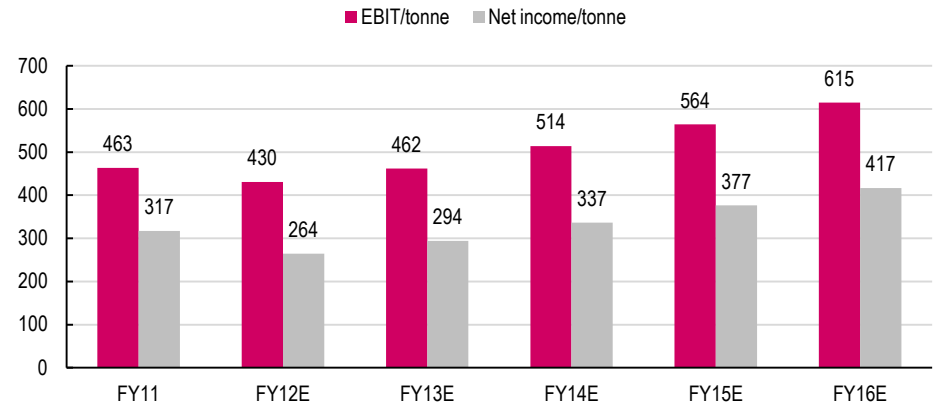
Source: Renaissance Capital estimates

We think ongoing improvement to seed varieties will be positive for the price mix (the link between seed pricing and commodity prices is reducing). We estimate 2% pa growth in pricing. This gives us revenue growing at 14.8% CAGR (FY11-16E). For FY12 we forecast 23% top-line growth vs management guidance of 25% – we think Zimbabwe sales may be lower but we expect good growth in other regions and seed varieties (particularly cotton).

Stronger bottom-line growth from production efficiencies

We expect some growth in gross margins (we forecast 53.7% by FY16) but we think EBITDA margins could grow on the back of operational efficiencies and with economies of scale. We think 35% is achievable by FY16 and we expect EBITDA CAGR of 19.3%. We think an increase in finance expenses (slightly offset by lower cost of debt) will result in the similar growth at the bottom line (20.1% CAGR). This gives us a forecast of 22.4% net margin by FY16 which looks easily achievable to us based on historical margins (achieved 24% in FY09. Earlier years are not comparable because of a hyperinflationary environment).

Figure 139: EBIT/t and net income/t (of sales), $

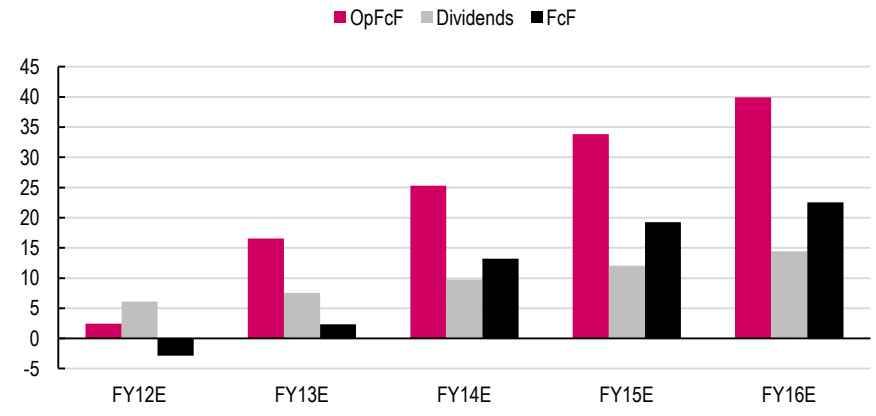


Source: Company data, Renaissance Capital estimates

Cash generation should remain strong despite increasing funding requirements

Given our outlook for higher reserves of seed we think short-term funding and net working capital will remain high in FY12 (23% and 60% of sales respectively), but should decline after that as stocks are depleted. We think cash generation will remain strong and interest cover should remain sufficient (6.0x in FY12 improving to 12.4x in FY16). We think capex will be 4-5% of revenue going forward. We conservatively forecast dividend payout of 33% but looking at cash generation we think there is upside risk to these estimates.

Figure 140: Comparison of OpFCF (after capex), dividends, and FCF, $mn



Source: Renaissance Capital estimates

Figure 141: Seed Co P&L, $mn

	FY10	FY11	FY12E	FY13E	FY14E	FY15E	FY16E	FY11E-16E CAGR
Revenue	77.0	97.8	119.9	136.4	156.9	176.3	194.8	15%
YoY		27.0%	22.6%	13.7%	15.1%	12.4%	10.5%	
Cost of Sales	(43.6)	(48.1)	(59.0)	(67.1)	(75.6)	(83.3)	(90.2)	13%
YoY		10.3%	22.6%	13.8%	12.7%	10.2%	8.3%	
% of net revenue	-56.7%	-49.2%	-49.2%	-49.2%	-48.2%	-47.2%	-46.3%	
Gross profit	33.4	49.7	60.9	69.2	81.3	93.0	104.6	16%
YoY		49.0%	22.6%	13.6%	17.4%	14.4%	12.5%	
GP margin (%)	43.3%	50.8%	50.8%	50.8%	51.8%	52.8%	53.7%	
Other operating income	2.0	3.7	2.4	2.7	3.1	3.5	3.9	1%
YoY		85.9%	-35.2%	13.7%	15.1%	12.4%	10.5%	
Operating expenses	-15.7	-25.2	-30.4	-32.9	-35.9	-38.4	-40.3	10%
YoY		60.5%	20.5%	8.2%	9.3%	6.8%	5.0%	
% of net revenue	-20.4%	-25.8%	-25.3%	-24.1%	-22.9%	-21.8%	-20.7%	
EBITDA	19.7	28.2	33.0	39.1	48.5	58.2	68.2	19%
YoY		43.5%	16.9%	18.6%	24.1%	19.9%	17.3%	
EBITDA margin (%)	25.5%	28.8%	27.5%	28.7%	30.9%	33.0%	35.0%	
Depreciation	(1.2)	(2.7)	(2.9)	(3.1)	(3.4)	(3.6)	(3.9)	7%
YoY		125.0%	8.0%	7.7%	8.5%	6.1%	6.9%	
EBIT	18.5	25.5	30.1	36.0	45.1	54.6	64.4	20%
YoY		38.2%	17.9%	19.6%	25.5%	20.9%	18.0%	
EBIT margin (%)	24.0%	26.1%	25.1%	26.4%	28.8%	30.9%	33.0%	
Net interest expense	-1.2	-2.9	-5.0	-4.9	-5.1	-5.2	-5.2	12%
YoY		141.7%	74.0%	-2.8%	3.1%	2.3%	0.5%	
PBT	18.0	23.4	25.0	31.1	40.1	49.4	59.2	20%
YoY		30.6%	6.7%	24.1%	29.0%	23.3%	19.8%	
Tax	-4.5	-6.0	-6.4	-7.9	-10.2	-12.6	-15.1	20%
Effective tax rate (%)	-25.1%	-25.5%	-25.5%	-25.5%	-25.5%	-25.5%	-25.5%	
PAT	13.5	17.5	18.6	23.1	29.9	36.8	44.1	20%
YoY		29.9%	6.7%	24.1%	29.0%	23.3%	19.8%	
PAT margin (%)	17.5%	17.9%	15.5%	17.0%	19.0%	20.9%	22.6%	
Minority interest	(0.6)	0.0	(0.2)	(0.2)	(0.3)	(0.4)	(0.4)	
YoY				24.1%	29.0%	23.3%	19.8%	
Net profit	12.9	17.5	18.5	22.9	29.6	36.4	43.7	20%
YoY		35.7%	5.6%	24.1%	29.0%	23.3%	19.8%	
Net profit margin (%)	16.7%	17.9%	15.4%	16.8%	18.8%	20.7%	22.4%	
YoY		6.8%	-13.9%	9.2%	12.1%	9.7%	8.4%	
Total common dividend	2.7	4.5	6.1	7.6	9.8	12.0	14.4	26%

Source: Company data, Renaissance Capital estimates

Figure 142: Seed Co balance sheet, $mn

	FY10	FY11	FY12E	FY13E	FY14E	FY15E	FY16E	FY11E-16E CAGR
Property, plant & equipment	37.0	40.0	43.1	46.8	49.6	53.1	57.0	7%
Investment property	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0%
Other non-current financial assets	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0%
Goodwill	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0%
Non-Current Assets	**37.5**	**41.1**	**44.2**	**47.9**	**50.7**	**54.2**	**58.1**	**7%**
Inventories	14.6	28.5	38.8	40.5	39.4	36.5	34.6	4%
Trade and other receivables	27.2	40.4	49.5	56.3	64.8	72.8	80.5	15%
Biological assets	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0%
Cash	9.6	5.0	2.2	4.5	17.7	37.0	59.5	64%
Other current assets	0.1	7.2	7.2	7.2	7.2	7.2	7.2	0%
Current assets	**52.0**	**81.5**	**98.0**	**108.9**	**129.5**	**153.9**	**182.1**	**17%**
Total assets	**89.5**	**122.6**	**142.2**	**156.7**	**180.2**	**208.1**	**240.2**	**14%**
Share capital	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0%
Capital reserves	21.1	17.0	17.0	17.0	17.0	17.0	17.0	0%
Retained earnings	35.8	52.8	65.2	80.5	100.3	124.7	154.0	24%
Equity attributable to equity holders of the parent	56.9	70.0	82.4	97.7	117.5	141.9	171.2	20%
Minority interest	2.4	0.0	0.2	0.4	0.7	1.1	1.5	
Total equity	**59.3**	**70.0**	**82.5**	**98.1**	**118.2**	**143.0**	**172.7**	**20%**
Long-term borrowings	0.0	0.0	0.0	1.2	2.1	2.7	2.8	
Finance lease liability	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0%
Deferred tax	11.2	12.4	12.4	12.4	12.4	12.4	12.4	0%
Non-current liabilities	**11.5**	**12.6**	**12.6**	**13.8**	**14.6**	**15.3**	**15.4**	4%
Borrowings	3.6	23.0	27.5	23.3	23.9	24.5	25.3	2%
Trade & other payables	9.8	11.2	13.7	15.6	17.5	19.3	20.9	13%
Finance lease liability	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0%
Current tax liability	4.7	3.2	3.2	3.2	3.2	3.2	3.2	0%
Other current liabilities	0.0	2.3	2.3	2.3	2.3	2.3	2.3	0%
Current liabilities	**18.6**	**40.0**	**47.3**	**44.9**	**47.4**	**49.9**	**52.2**	5%
Total equity & liabilities	**89.4**	**122.5**	**142.4**	**156.8**	**180.3**	**208.1**	**240.3**	**14%**

Source: Company data, Renaissance Capital estimates

Figure 143: Seed Co cash flow statement, $mn

	FY12E	FY13E	FY14E	FY15E	FY16E
EBIT	30.1	36.0	45.1	54.6	64.4
Tax on EBIT	-7.7	-9.2	-11.5	-13.9	-16.4
NOPLAT	22.4	26.8	33.6	40.7	48.0
D&A	2.9	3.1	3.4	3.6	3.9
Change in NWC	-16.9	-6.6	-5.4	-3.4	-4.1
Capex	-6.0	-6.8	-6.3	-7.1	-7.8
% of gross sales	5%	5%	4%	4%	4%
OpFCF	2.4	16.6	25.3	33.8	39.9
YoY	-97%	581%	53%	34%	18%
Dividends	-6.1	-7.6	-9.8	-12.0	-14.4
Financial costs	-5.0	-4.9	-5.1	-5.2	-5.2
Borrowings	4.6	-3.0	1.4	1.3	0.9
Capital increase	0.0	0.0	0.0	0.0	0.0
Tax adjustments	1.3	1.2	1.3	1.3	1.3
Other	0.0	0.0	0.0	0.0	0.0
FCF	-2.9	2.4	13.2	19.3	22.5
YoY	-50%	-182%	461%	46%	17%

Source: Company data, Renaissance Capital estimates

Valuation

We use a combination of multiples-based and DCF approaches to value Seed Co. For our multiples-based we take average 2012E P/E and EV/EBITDA multiples for international agricultural companies (9.1x and 5.6x respectively). Applying these to our 2012 forecasts we derive equity values of $198mn and $192mn, respectively. For our DCF we use a WACC of 17.4% and a long-term growth rate of 5%. This yields an equity value of $243mn. Averaging these three approaches we get a target equity value of $211mn and TP of $1.10/share which is in line with its current pricing. We initiate with a **HOLD** rating on the stock.

Figure 144: WACC assumptions

Risk free	7.0%
Market risk premium	10%
Beta	1.10
Cost of equity	17%
After tax cost of debt	13.5%
Target debt ratio	14%
WACC	17.4%

Source: Renaissance Capital estimates

Figure 145: Seed Co DCF valuation

		31-Mar-12	31-Mar-13	31-Mar-14	31-Mar-15	31-Mar-16	31-Mar-17	31-Mar-18
WACC	17.4%							
OPFCF		2.4	16.6	25.3	33.8	39.9	39.9	47.5
YoY			581%	53%	34%	18%	0%	19%
Discount factor		0.97	0.87	0.74	0.63	0.54	0.46	0.39
Discounted cash flows		0.9	14.4	18.7	21.3	21.5	18.3	18.5
Terminal value		157.1						
Discounted terminal value		147.6						
EV (Sum of discounted cash flows and terminal value)		261.2						
Net debt end 2011e		17.9						
Equity DCF fair value		243.3						
DCF fair value/share ($)		1.27						

Source: Renaissance Capital estimates

Figure 146: Sensitivity analysis to WACC and growth rate

		WACC				
	1.27	19.4%	18.4%	17.4%	16.4%	15.4%
Long term growth rate	3%	0.98	1.06	1.14	1.25	1.37
	4%	1.02	1.10	1.20	1.31	1.45
	5%	1.06	1.15	1.26	1.39	1.54
	6%	1.11	1.22	1.34	1.48	1.66
	7%	1.17	1.29	1.43	1.60	1.81

Source: Renaissance Capital estimates

Figure 147: EV/EBITDA multiple-based valuation

2012E EV/EBITDA	5.6	2012E P/E	9.1
2012E EBITDA	37.6	2012E EPS	0.11
EV Fair value	210.2	Fair value per share	1.03
Net debt	17.9		
Equity fair value	192.3		
Fair value per share	1.00		

Source: Renaissance Capital estimates

Figure 148: Seed Co fair value per share, $

DCF fair value	1.27
2012E P/E based fair value	1.03
2012E EV/EBITDA based fair value	1.00
Average	**1.10**

Source: Renaissance Capital estimates

Figure 149: International agriculture sector comps

	P/E			EV/EBITDA		
	2011E	2012E	2012E	2011E	2012E	2012E
Rusagro	7.0	4.8	3.8	5.4	3.6	2.6
Razgulay	5.9	7.8	2.2	6.3	6.7	5.0
Kernel	7.5	5.8	4.9	6.5	5.5	4.9
Mriya	5.5	3.7	2.9	5.1	3.6	2.8
Astarta Holding	5.7	5.4	4.1	5.3	4.8	3.7
Astarta Holding (Bloomberg consensus)	21.6	21.7	17.7	4.9	4.8	3.8
Black Earth Farming (BEF)	nm	17.6	7.5	18.8	9.0	5.2
Sintal	5.2	4.3	3.5	3.9	3.3	2.7
Russian Grain	15.6	13.8	19.9	4.1	3.9	4.0
Landkom	neg	neg	neg	46.5	4.1	3.5
MCB Agricole	4.6	3.4	2.7	2.6	1.9	1.5
Archer-Daniels-Midland	9.8	9.2	8.6	7.8	7.3	7.4
Bunge	9.4	8.8	8.0	8.4	7.6	7.0
China Agri-Industries	8.3	6.8	5.9	11.8	9.6	7.9
Viterra	13.6	13.3	12.8	6.9	7.0	6.8
KWS Saat	14.4	13.2	12.6	7.3	6.9	6.5
GrainCorp	9.8	10.3	12.5	7.2	7.2	8.2
Andersons	8.2	8.6	na	6.2	6.4	na
Agricola	15.5	14.5	na	7.3	7.3	na
Zambeef (Lusaka)	8.7	4.4	3.2	13.7	5.9	4.8
Zambeef (AIM)	12.6	6.0	4.5	18.2	7.8	6.4
Feronia	na	5.4	3.0	na	1.7	1.0
Average	**10.4**	**9.1**	**7.5**	**9.2**	**5.6**	**4.6**

Source: Bloomberg, Renaissance Capital estimates

Compared with our SSA 2012 average multiples, Seed Co is trading at a premium on EV/EBITDA basis (6%) and on a P/E basis (4%). We emphasise that there is upside risk to our estimates. We highlight some events that could trigger stronger results:

- Improved stability in the Zimbabwe market – therefore better liquidity and sales, and lower carryover stocks and reduced financing needs.
- Quicker expansion into West Africa – we have not included this market in our forecasts.
- Introduction of GMO seed – we have not factored this into our forecasts. We expect it would have a positive impact on profitability per tonne.
- Roll-out of cotton seed business into other regions (Malawi, Zambia).

Agriculture
Zimbabwe

Company report
Equity Research

21 November 2011

Renaissance Capital

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AICO Africa

Unlocking growth potential

- **We do not think the market is factoring Cottco's potential into AICO Africa's share price.** We have seen a positive turnaround at Cottco, and we still see potential for solid growth. We expect a combination of slightly firmer lint prices and increased cotton intake to drive the top line, with lower breakeven volumes and declining debt leading to improved profitability. While we expect top and bottom line FY11-16E CAGRs of 10.1% and 28.9%, respectively, we recognise that our forecasts depend on a number of assumptions, including the lint price, producer price, losses to side-marketing and finance costs.
- **Growth potential for Seed Co is still significant.** We expect growth to be strongest in East Africa, where local production has just commenced. In the medium-to-long term, we view West Africa as an opportunity. We think economies of scale, localised production in East Africa, enhanced processing capabilities and the ongoing development of higher-quality seed varieties will all contribute to margin growth.
- **An uncertain outlook for Olivine.** We believe a working capital injection and the reinstatement of duties on cooking oil may catalyse a recovery. However we highlight numerous constraints: erratic power, constrained soya bean supply, input cost inflation and a long working capital cycle due to expensive short-term funding. We are more cautious in our forecasts for this business, and we assign a low valuation of $3.1mn (only 2% of our total valuation).
- **TP $0.34/share, BUY.** Using a SoTP approach, we value AICO at $178mn. For each business, we take an average of DCF and multiples-based valuations (P/E and EV/EBITDA). We apply discounts to multiples for Cottco and Olivine, due to low profitability. The total valuation is driven by Seed Co (61%) and Cottco (38%) with a low value assigned to Olivine. Our TP (previously Under Review) implies 72% potential upside.

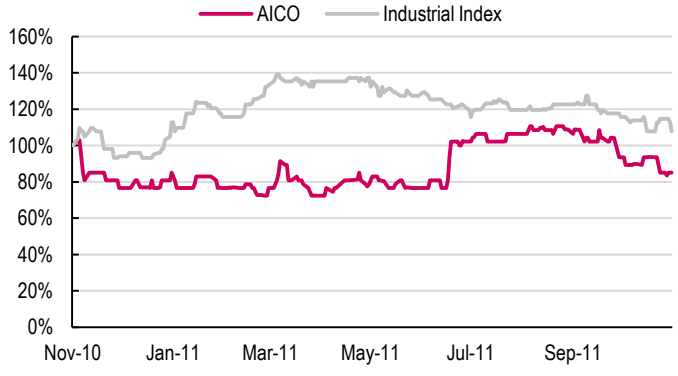
Report date:	**21 November 2011**
Rating common/pref.	**BUY**/na
Target price (comm), $	0.34
Target price (pref), $	na
Current price (comm), $	0.195
Current price (pref), $	na
MktCap, $mn	104.2
EV, $mn	188.7
Reuters	AICO.ZI
Bloomberg	AICO ZH Equity
ADRs/GDRs since	na
ADRs/GDRs per common share	na
Common shares outstanding, mn	534.4
Change from 52-week high:	-23.1%
Date of 52-week high:	06/09/2011
Change from 52-week low:	17.6%
Date of 52-week low:	14/04/2011
Web:	www.aicoafrica.co
Free float in $mn	41
Average daily traded volume in $mn	0.09
Share price performance over the last 1 month	-7.1%
3 months	-25.0%
12 months	-2.5%

Summary valuation and financials, $mn

	Revenue	EBITDA	Net income	EPS, $	DPS, $	EBITDA margin	EV	Net debt	EV/Sales	EV/CF	EV/EBITDA	P/E	P/B	Div yield	RoIC/ WACC,
2010	198.7	35.7	5.6	0.01	0.00	18.0%	178.8	74.6	0.95	na	5.29	18.40	0.90	0.0%	4.6%
2011E	258.4	49.2	8.7	0.02	0.00	19.1%	205.4	101.2	0.73	462.59	3.83	11.96	0.80	0.0%	6.1%
2012E	285.2	64.9	18.1	0.03	0.01	22.8%	195.2	91.0	0.66	5.23	2.91	5.75	0.68	5.1%	10.7%
2013E	315.9	76.7	25.3	0.05	0.02	24.3%	177.0	72.8	0.60	4.41	2.46	4.11	0.57	8.0%	12.4%

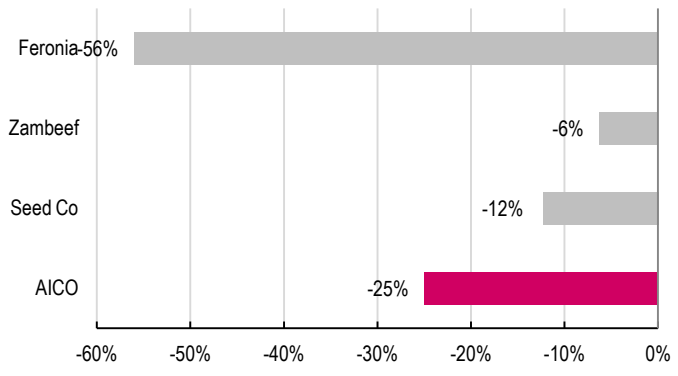
Source: Renaissance Capital estimates

Figure 150: Price performance – 52 weeks



Source: Zimbabwe Stock Exchange

Figure 151: Sector stock performance – 3 months



Source: Bloomberg

Investment summary

Based on recent developments in global and local markets, together with changed expectations with regard to its financing strategy, we update our forecasts and valuation for AICO; however, our investment case remains intact. Based on our updated financial forecasts and using a SoTP method in our valuation, we obtain a 2012 TP of $0.34/share (previously Under Review), implying 72% potential upside. We place a **BUY** rating on the stock.

Figure 152: Valuation summary, $mn

Cottco	67.3
Seed Co	107.9
Olivine	3.1
EV	178.3
Shares in issue, mn	531
TP, $	0.34
Current price, $	0.195
Upside potential	72%

Source: Renaissance Capital estimates

We do not think Cottco's potential has been priced in – AICO's current valuation relative to Seed Co's suggests no value is given to Cottco or Olivine: we believe investors are getting these companies for free.

We are positive on the outlook for Cottco. FY11 performance showed a marked, improvement which we attribute to the reduction of overheads and improving cotton intake and lint prices. This recovery is from a low base, and we still see significant potential for growth. We think a combination of slightly firmer lint prices and increased cotton intake will drive the top line, and lower breakeven volumes and declining debt will lead to improved profitability. We conservatively forecast revenue and net income will grow at 10.1% and 28.9% CAGRs, respectively, over FY11-16. We recognise that our forecasts depend on a number of assumptions such as the lint price, producer price, losses to side-marketing and finance costs.

Seed Co continues to deliver solid performance, and we still see significant growth potential, particularly in East Africa and West Africa (in the medium-to-long term). We think economies of scale, localised production in East Africa, enhanced processing capabilities, and the ongoing development of higher-quality seed varieties will all contribute to margin growth. We forecast revenue and net income will grow at 14.8% and 20.1% CAGRs, respectively, over FY11-16.

The outlook for Olivine is still uncertain, in our view. While a recent working capital injection may help production output, and the reinstatement of duties on cooking oil should improve competitiveness, we think there are still a number of constraints. These include erratic power, constrained soya bean supply, input cost inflation, and a long working capital cycle due to expensive short-term funding. We are more cautious in our forecast for this business; we expect a top line CAGR of 31.4% (FY11-16), but we think the business will only turn a profit in FY14.

Company and market update

Group overview

AICO Africa Limited is an agro-industrial conglomerate listed on the Zimbabwe Stock Exchange. The group comprises three core businesses – The Cotton Company of Zimbabwe (Cottco; 100% owned), Seed Co Limited (51% owned), and Olivine Holdings (49% JV with Industrial Development Corporation). Non-core operations which are up for disposal include Scottco (a spinning business) and Exhort Enterprises (a processor of frozen vegetables).

Cottco: Turnaround in progress

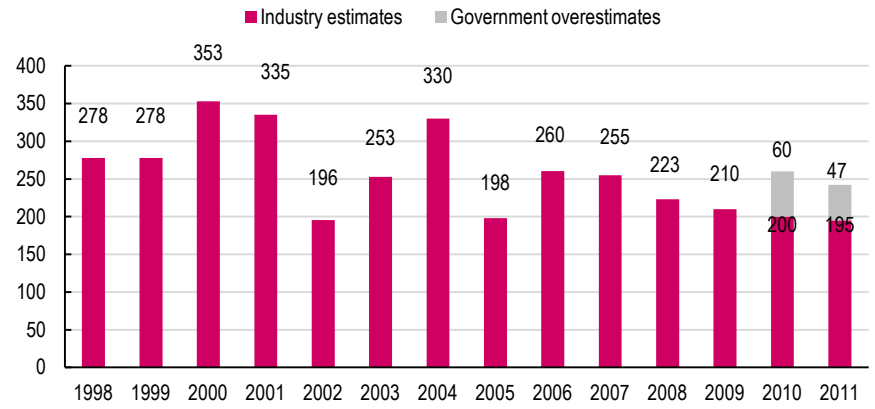
Cottco is the biggest cotton processor and marketer in Sub-Saharan Africa, with nine ginneries across the country. Cottco is involved in every facet of cotton production and sales, including the provision of agronomic advisory services, production and merchandising of planting seed, supply of chemicals and fertiliser, ginning, warehousing as well as marketing lint and cotton seed in global and local markets. Its historical market share (over FY03-10) has averaged 50%-plus, and its main competitors include Cargill Zimbabwe and Olam International (with 20% and 10% market shares, respectively).

Cottco has performed poorly since the Zimbabwean economy dollarised. This reflects a number of negative factors/trends, including high overheads, expensive legacy short-term debt (over $45mn), a loss of cotton intake to side-marketers and failure to cash-in on rising lint prices. Cottco appears to have turned around its fortunes, delivering a profit in FY11 (YE March) despite market expectations of a loss. We attribute the improvement in FY11 to the reduction of overheads, and improving cotton intake and lint prices. The debt overhang continues to weigh on profitability. Despite this recovery, it is off a low base and we still see significant potential for growth. We highlight some positive trends and potential catalysts that we believe could encourage better performance going forward.

Potential for increased national output: GMO seed a potential catalyst

National output rebounded following dollarisation, and rising producer prices encouraged increased acreage (prices increased from $0.30/kg in 2009 to $0.80/kg in early 2011). Growth seems to have levelled off more recently, we think due to funding constraints in the sector. Better liquidity together with improved contractor confidence could result in increased acreage, in our view. We think a more powerful catalyst for cotton output, however, is the introduction of genetically modified (GMO) seed which is still not used commercially in Africa (apart from South Africa).Trials are permissible under supervision, and management believes commercial use is potentially two-to-three years away. We think yields could potentially double from 0.7-0.8 t/ha (as has happened in other regions).

Figure 153: Zimbabwe – national cotton output, kt



*Discrepancies between government figures and industry figures

Source: Commercial Farmers Union, Fiscal Policy and Monetary Policy statements

Tightened legislation reducing side-marketing and expected to increase contractor confidence

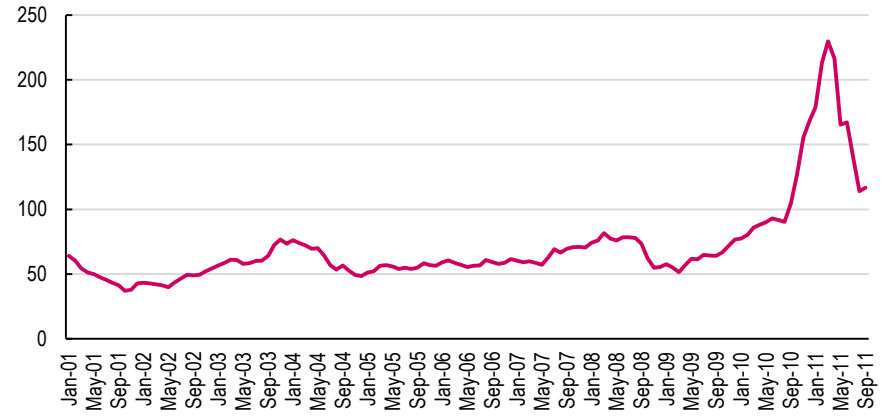
Some 95% of the nation's cotton crop is funded by the private sector by way of input credit schemes. Cotton ginners and merchants belonging to the Cotton Ginners Association (CGA) contract farmers to produce cotton and provide them with inputs at the start of the season. Once the crop is harvested, farmers are committed to selling the raw cotton to contractors and they receive a net payment for the crop (at a price agreed at the start of the season). Unregulated buyers emerged during hyperinflation, offering higher prices to farmers for cotton that they had not funded. Cottco lost out on 33kt of intake in FY10, as a result of side-marketing, representing a $30mn loss of revenue, on our estimates. Legislation introduced in 2009 (Statutory Instrument 142, and later SI 63) brought more order to the process, but proper enforcement is a greater concern, we believe. Awareness of establishing long-term relationships between farmers and contractors and the benefits to both parties, appears to be growing (according to management). Management expects less side-sales going forward. We expect an improvement but we still account for some level of risk (10%-15% losses). If side-sales are successfully reduced this could be very positive for contractors' confidence and could encourage greater supply of inputs. This means more acreage under crop and potentially better yields (there is no need to stretch inputs thinly if they are more readily available).

Lint prices declining, but still above historical levels

Lint prices rose sharply from 4Q10 (CY) peaking in March 2011 (Cotlook A reached $2.44/lb), and the season average doubled YoY. Cottco failed to cash-in on these high prices with its FY11 lint sales; however, in FY12 we believe more than one-third was sold at prices ranging from $1.85-2.00/lb (according to management). Prices have since softened to just over $1/lb but this is still above historical levels (Cotlook A Index 10-year average $0.60/lb), and in particular above prices achieved by Cottco in prior years. The ICAC expects a rise in world cotton production in 2011-2012, encouraged by higher producer prices. A surplus and improvement in the global stocks-to-use ratio is expected to put downward pressure on prices, but they are not expected to fall to previous levels of $0.60/lb (according to ICAC). However, we think prices are more likely to rise with a combination of unrelenting Chinese

demand, supply constraints, as well as monetary easing which is likely to have an inflationary impact. To be conservative, we assume $1/lb for FY13 and $0.90/lb from FY14 onwards.

Figure 154: Cotlook A Index, January 2001-September 2011



Source: National Cotton Council of America

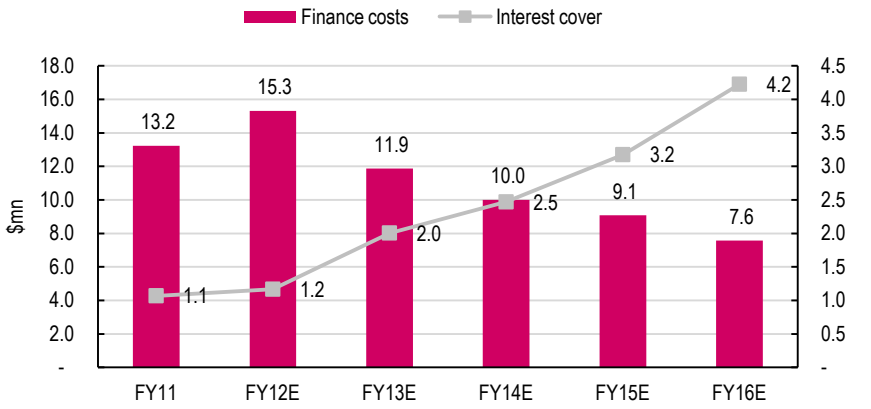
Overheads reduced, benefits should continue to accrue in FY12

A voluntary retrenchment exercise saw permanent headcount reduced by more than half (from 540 to 220) in FY11, with $2.7mn paid in severance packages (a non-recurring cost). Break-even volumes are now significantly lower and we should continue to see the benefits reflecting at the EBITDA line.

Elimination/restructuring of legacy short-term debt

Cottco's balance of short-term legacy debt (annual revolving debt) is $38mn (it was much higher previously but $15mn has been restructured with long-term debt and $5mn paid off). Following pushback on a proposed equity raise, and given challenges/delays in raising debt, management has earmarked proceeds from disposals of non-core businesses to write down this debt. This will be complemented by internally generated cash, and potentially long-term debt if it can be secured (AICO was negotiating with lenders at the time of the FY11 results release [28 June 2011]). In June, management was estimating it would be out of the debt position in 12-18 months. We expect raising finance to remain a challenge in the near term, and we understand that disposal of the non-core businesses is also proving challenging. Therefore, we are relatively conservative in our forecasts, assuming a gradual payoff using only internal resources. We think this could take closer to five years and we estimate that the total debt balance will reduce to $12mn by FY16. We forecast an improvement in interest cover from 1.1x in FY11 to 4.2x in FY16. We think the reduction in finance costs alone will improve net margins by 2 ppts over FY11-16.

Figure 155: Finance costs ($mn) vs interest cover ratio, x



Source: Company data, Renaissance Capital estimates

Expansion into new markets

Management has expressed an intention to expand into other SSA countries, leveraging Seed Co's presence. However, we think this is some time off, as the main focus will first be on improving profitability at the Zimbabwe operation. We do not incorporate this in our forecasts.

Risks

Climatic risk: Cotton grows well in semi-arid conditions, but sufficient rainfall is a key component for a good crop.

Side-marketing: Lax enforcement of regulations is a risk. We still account for some level of side-marketing in our forecasts (10-15%).

Falling lint prices: Prices have declined sharply this year from over $2/lb to $1/lb, and indications are that further declines are possible in the short term. We have assumed a constant price of $0.90/lb for cotton from FY14, but we see downside risk to this estimate.

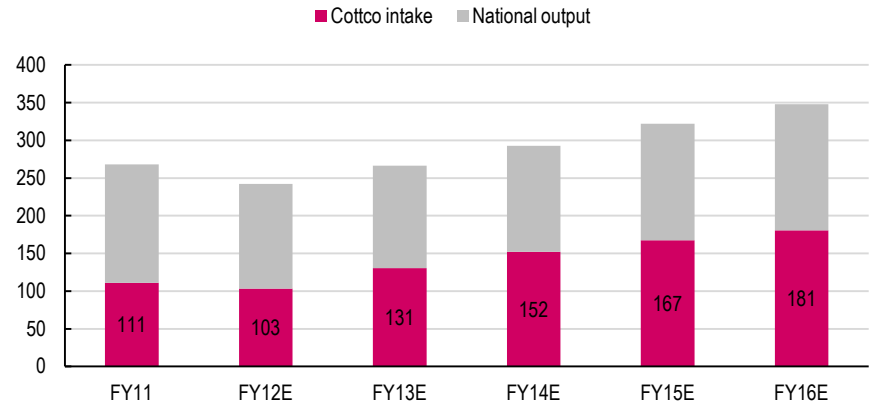
Negotiating producer prices: This is a contentious issue every season, and there is pressure on contractors to support farmers with good prices. For FY12 we believe farmers were being paid $0.80-90/kg. This could have a negative impact on Cottco's margins given that lint prices have subsequently declined: this will depend on whether producer prices were revised downwards, and how much lint Cottco was able to sell forward at the high pricing.

Financial forecasts

We are fairly cautious in our growth forecasts given uncertainty on the political outlook (which has a huge bearing on the economy and liquidity). At AICO's interim results presentation (16 November), management indicated that national output had

declined to 242kt due to drought conditions in some parts of the country. Cottco's intake had also declined (7% YoY) to 103kt. We think actual intake will grow at CAGR of 10% over FY11-16E, which gives intake of 181kt by FY16E – well below management's target of 400kt.

Figure 156: Forecasts for national cotton production and Cottco's intake, kt



*national output figures are government estimates

Source: Company data, Renaissance Capital estimates

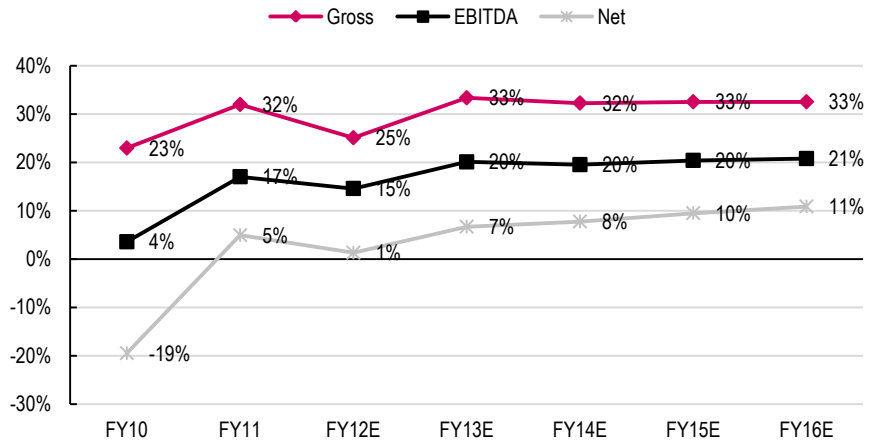
For FY12 we assume one-half of lint was sold forward at higher prices, and we use an average price of $1.40/lb for the year (we assume one-half at $1.80/lb and the remainder at $1.00/lb). While we think prices may actually rise, we cautiously forecast a price of $1/lb for FY13 and $0.90/share for FY14 onwards, giving revenue growth of 10.1% (CAGR FY11-16E).

Cottco's gross margin rebounded strongly in FY11, to 32%, and management sees little upside potential from this level. We actually expect a decline in FY12; because high producer prices were paid throughout the season (we estimate $0.90/kg). We think a combination of higher intake, lower break-even volumes and a gradual decline in finance costs (following the write-down of legacy debt) will contribute to solid bottom-line growth from FY13 onwards. We think the EBITDA margin could grow to 20.8% by FY16, from 17.1% in FY11 (we forecast only 14.6% for FY12) and the net margin could more than double from 5% in FY11 to 10.9% in FY16 (we forecast 1.3% for FY12).

We think these estimates are cautious; a number of events could trigger much stronger performance, specifically:

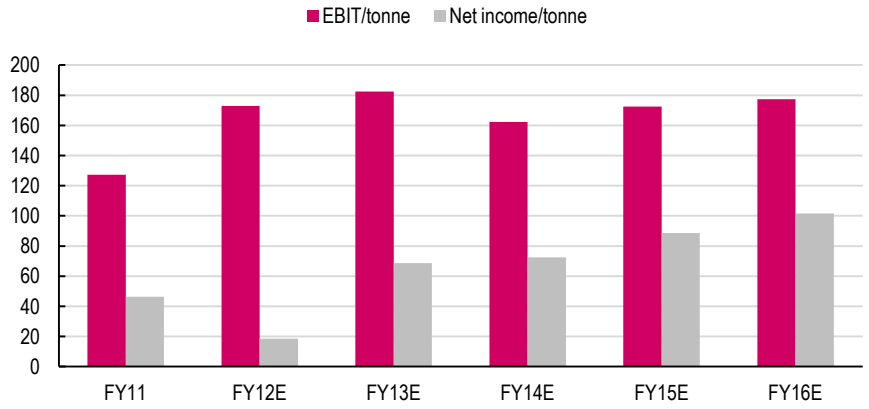
- The introduction of GMO cotton seed
- An improvement in political and economic stability: better liquidity and support for farmers
- Higher cotton prices
- Securing long-term funding to restructure short-term debt
- Regional expansion

157: Cottco – margin progression and our forecasts



Source: Company data, Renaissance Capital estimates

Figure 158: Cottco – EBIT/tonne of intake, net income/t



Source: Company data, Renaissance Capital estimates

Figure 159: Cottco financial forecasts

	FY11	FY12E	FY13E	FY14E	FY15E	FY16E	FY11E-16E CAGR
National output, kt	268	242	266	293	322	348	5%
Growth		-10%	10%	10%	10%	8%	
Targeted intake, t	144	140	154	169	186	201	7%
Growth		-3%	10%	10%	10%	8%	
Actual intake, t	111	103	131	152	167	181	10%
% of target	77%	74%	85%	90%	90%	90%	
Lint sold, mn lb	100	93	118	137	151	163	10%
Growth		-7%	26%	16%	10%	8%	
Lint price, $/lb	0.88	1.40	1.00	0.90	0.90	0.90	0%
Lint revenue, $mn	88.2	130.4	117.8	123.5	135.8	146.7	11%
Growth		48%	-10%	5%	10%	8%	
Other revenue, $mn	15.6	12.2	15.4	17.9	19.7	21.3	6%
Cottco revenue, $mn	103.7	142.6	133.2	141.4	155.6	168.0	10%
Growth		38%	-7%	6%	10%	8%	
Internal revenue	-10.0	-9.8	-12.3	-16.2	-19.7	-21.3	
Net revenue, $mn	93.7	132.9	120.9	125.3	135.8	146.7	9%
Growth		42%	-9%	4%	8%	8%	
Gross profit, $mn	33.2	35.8	44.5	45.7	50.7	54.7	11%
Growth		8%	24%	3%	11%	8%	
% revenue	32.0%	25.1%	33.4%	32.3%	32.6%	32.6%	
EBITDA	17.7	20.9	26.8	27.7	31.8	35.0	15%
Growth		18%	28%	3%	15%	10%	
% revenue	17.1%	14.6%	20.1%	19.6%	20.4%	20.8%	
EBIT	14.1	17.9	23.8	24.7	28.8	32.0	18%
Growth		26%	33%	4%	17%	11%	
% revenue	13.6%	12.5%	17.9%	17.5%	18.5%	19.1%	
PBT	2.5	2.6	11.9	14.7	19.8	24.5	58%
Growth		2%	367%	23%	34%	24%	
% revenue	2.4%	1.8%	9.0%	10.4%	12.7%	14.6%	
Net income	5.2	1.9	9.0	11.0	14.8	18.3	29%
Growth		-63%	367%	23%	34%	24%	
% revenue	5.0%	1.3%	6.7%	7.8%	9.5%	10.9%	

Source: Renaissance Capital estimates

Scenario analysis

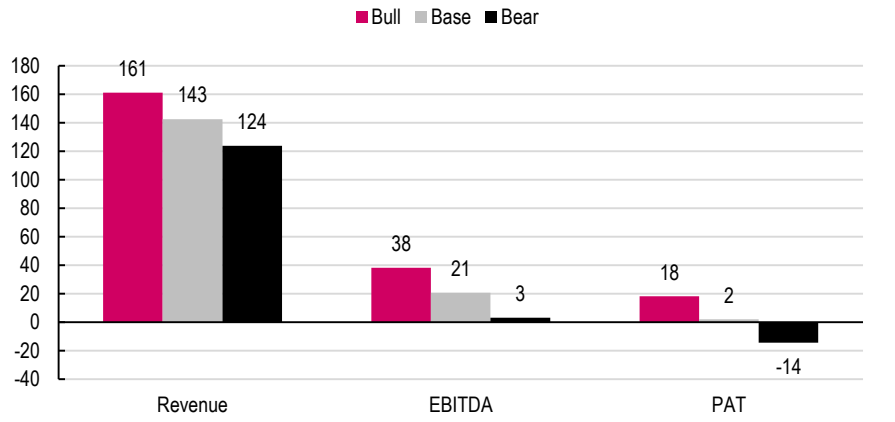
Our forecasts hinge on a number of key assumptions, including the lint price, producer price, losses to side-marketing and finance costs. We highlight three scenarios – *bear*, *base* and *bull* cases, to show sensitivities to these factors (see Figure 158).

Figure 160: Scenario analysis assumptions for FY12 performance

	Base case	Bear case	Bull case
Lint price, $/lb	1.40	1.20	1.60
Producer price, $/kg	0.90	0.95	0.80
Interest expense, $mn	-15.3	-19.3	-11.3

Source: Renaissance Capital estimates

Figure 161: Revenue, EBITDA and PAT forecasts under three scenarios, $mn



Source: Renaissance Capital estimates

We also show a sensitivity analysis of our PAT forecasts to the lint price. While Cottco does enter into forward contracts to protect against price volatility, we think changes in price will have a significant impact on profitability.

Figure 162: Sensitivity of PAT to lint price

	Lint price, $/lb					
PAT $mn	0.70	0.80	0.90	1.00	1.10	1.20
FY13E	0.7	3.5	6.2	**9.0**	11.7	14.4
FY14E	4.6	7.8	**11.0**	14.2	17.4	20.6
FY15E	7.8	11.3	**14.8**	18.3	21.8	25.4
FY16E	-7.6	10.8	**14.6**	18.3	22.1	25.9

Source: Renaissance Capital estimates

Valuation

We value Cottco using an average of P/E and EV/EBITDA multiples-based valuations, as well as DCF. For peer comparison, we use international agriculture companies and apply a 15% discount given Cottco's high gearing and low profitability. We use 2012E discounted multiples of 7.7x (P/E) and 4.7x (EV/EBITDA). For our DCF, we use a WACC of 19.8% (cost of equity 21%, after-tax cost of debt 15%, and target debt ratio 20%) and a long-term growth rate of 5%. Taking an average of all three methods yields an equity value of $67.3mn.

Figure 163: Cottco DCF valuation

		31 March 2012E	31 March 2013E	31 March 2014E	31 March 2015E	31 March 2016E	31 March 2017E	31 March 2018E
WACC used in DCF	19.8%							
Op. CF		(1.6)	10.8	11.1	14.0	17.3	20.1	22.7
YoY			-757%	3%	27%	23%	17%	13%
Discount factor		0.97	0.85	0.71	0.59	0.50	0.41	0.35
Discounted cash flows		(0.6)	9.2	7.9	8.4	8.6	8.4	7.9
Terminal value		60.4						
Discounted terminal value		56.7						
EV (sum of discounted cash flows and terminal value)		106.4						
Net debt, end-2011E		40.0						
Equity DCF fair value		66.4						

Source: Renaissance Capital estimates

Figure 164: EV/EBITDA multiples-based valuation

2012E EV/EBITDA	4.7	2012E P/E	7.7
2012E EBITDA	25.3	2012E net income	7.2
EV fair value, $mn	119.9	Equity fair value, $mn	55.5
Net debt, $mn	40.0		
Equity fair value, $mn	79.9		

Source: Renaissance Capital estimates

Figure 165: Cottco fair value, $mn

DCF fair value	66.4
2012E P/E-based fair value, $mn	55.5
2012E EV/EBITDA based fair value	79.9
Average	**67.3**

Source: Renaissance Capital estimates

Figure 166: International agriculture sector comps

	P/E			EV/EBITDA		
	2011E	2012E	2012E	2011E	2012E	2012E
Rusagro	5.6	6.9	5.8	4.7	4.7	3.4
Razgulay	5.6	4.3	2.4	5.9	5.5	4.9
Kernel	7.6	5.9	5.0	6.5	5.5	4.9
Mriya	5.5	3.8	2.9	5.2	3.6	2.8
Astarta Holding	7.0	6.6	5.0	6.2	5.6	4.3
Astarta Holding (Bloomberg consensus)	26.8	24.8	21.2	6.0	5.4	4.5
Black Earth Farming (BEF)	nm	19.5	8.3	19.9	10.0	5.7
Sintal	8.7	7.1	5.8	6.1	5.1	4.2
Russian Grain	15.7	13.2	19.3	4.2	3.8	4.0
Landkom	neg	7.2	3.1	2.9	1.6	1.0
MCB Agricole	5.7	4.3	3.3	3.5	2.6	2.0
Archer-Daniels-Midland	8.4	8.1	7.3	7.9	7.3	7.6
Bunge	8.4	8.2	7.5	8.1	7.2	6.7
China Agri-Industries	8.7	7.1	6.4	10.3	8.4	7.1
Viterra	13.0	12.1	11.8	7.4	7.3	6.8
KWS Saat	12.2	12.9	11.8	6.4	6.5	6.1
GrainCorp	8.9	9.6	11.8	6.7	7.0	7.9
Andersons	8.4	8.7	na	6.3	6.6	na
Agricola	13.1	12.1	na	6.4	6.2	na
Zambeef (Lusaka)	8.7	4.4	3.2	13.7	5.9	4.8
Zambeef (AIM)	12.6	6.0	4.5	18.2	7.8	6.4
Feronia	na	5.4	3.0	na	1.7	1.0
Average	**10.4**	**9.1**	**7.6**	**7.1**	**5.6**	**4.7**
Discount	15%					
Discounted multiples	**8.8**	**7.7**	**6.5**	**6.0**	**4.7**	**4.0**

Source: Bloomberg, Renaissance Capital estimates

Seed Co: Delivering solid growth

Seed Co develops, produces markets and sells hybrid maize and other broad acre crop seeds, and is the market leader in Zimbabwe, Zambia and Malawi. It is 51% owned by AICO but it is also separately listed on the ZSE. We rate Seed Co **HOLD** with a TP of $1.10/share (see separate Seed Co section, included in this report).

Investment case

The dominant seed producer in Southern Africa: Seed Co is the biggest seed house in Zimbabwe (70% market share), Zambia (50%) and Malawi (50%). We think its strong research capabilities, growing reputation and knowledge of African markets will aid its expansion ambitions into the rest of Africa.

We think East Africa will be the group's next growth hub. These are potentially much bigger than Seed Co's existing markets. Seed Co is already selling in this region (8-10kt) and has recently commenced local production. In Kenya it is only selling seed suitable for lowland areas but the real growth opportunity lies in the highlands market (35kt in size vs. 8k for lowlands). Research work on a suitable variety is ongoing, and management expect the first varieties to be commercialised soon. Collaboration work with research institutions in West Africa is gathering steam and we view this market as a medium-to-long-term opportunity.

Catalysts for margin growth. We see upside to EBITDA margins coming from economies of scale, localised production in East Africa, enhanced processing capabilities and the ongoing development of higher quality seed varieties. We also think a potential alliance with Monsanto will help it stay abreast of modern developments and should prepare it for when GMO seed comes to Africa.

We see upside risks to our forecasts. Potential catalysts that we have not accounted for include: 1) quicker expansion into West Africa, 2) the introduction of GMO seed, 3) the roll-out of the cotton seed business into other countries, and 4) a sooner-than-expected improvement in Zimbabwe's economic and political landscape. While we think upside risks are higher, we see potential downside risks including liquidity constraints in Zimbabwe, credit risk and FX risk.

Summary of forecasts

Figure 167: Seed Co financial forecasts

	FY11	FY12E	FY13E	FY14E	FY15E	FY16E	FY11E-16E CAGR
Seed Co revenue	97.8	119.9	136.4	156.9	176.3	194.8	15%
Growth		23%	14%	15%	12%	10%	
Gross profit, $mn	49.7	60.9	69.2	81.3	93.0	104.6	16%
Growth		23%	14%	17%	14%	12%	
% revenue	51%	51%	51%	52%	53%	54%	
EBITDA	28.2	33.0	39.1	48.5	58.2	68.2	19%
Growth		17%	19%	24%	20%	17%	
% revenue	29%	28%	29%	31%	33%	35%	
EBIT	25.5	30.1	36.0	45.1	54.6	64.4	20%
Growth		18%	20%	25%	21%	18%	
% revenue	26%	25%	26%	29%	31%	33%	
PBT	23.4	25.0	31.1	40.1	49.4	59.2	20%
Growth		7%	24%	29%	23%	20%	
% revenue	24%	21%	23%	26%	28%	30%	
Net income	17.5	18.5	22.9	29.6	36.4	43.7	20%
Growth		6%	24%	29%	23%	20%	
% revenue	18%	15%	17%	19%	21%	22%	

Source: Renaissance Capital estimates

Valuation

Figure 168: Seed Co fair value, $mn

DCF fair value	243.4
2012E P/E-based fair value	197.6
2012E EV/EBITDA based fair value	192.2
Average	211.1
AICO's 51% share	**107.9**

Source: Renaissance Capital estimates

Olivine Holdings: Weighing on group performance

Olivine is a manufacturer and marketer of household goods and fast-moving consumer goods (FMCG). Its main product lines include cooking oil, bakers' fats, margarine, soaps, and canned foods. AICO owns 49% and holds the management contract (it is accounted for as a JV). The other 51% is held by the Industrial Development Corporation of Zimbabwe (IDC).

Unfavourable conditions in the manufacturing sector and Olivine's failure to deliver profits have called into question management's resolve to hold onto its stake in Olivine. Recovery of this sector has been slow, largely due to a lack of liquidity to finance recapitalisation, insufficient output from local agriculture, erratic utilities supply, increased overheads, and competition from cheap imports. The outlook for this sector is still uncertain, however management maintains this is an important component of group growth. It has strong synergies with Cottco and the byproduct of the ginning process (cotton seed) is part of the value-add process at Olivine.

We highlight some potential catalysts that could kick start the recovery of this business.

Working capital injection

Both partners in Olivine (AICO and IDC) agreed to inject capital for working capital and debt restructuring, and so far $4.1mn has been injected by AICO (according to management). Another $7.5mn is expected by end Jan 2012 ($6mn from IDC and $1.5mn from AICO). AICO's contribution was expected to come from the Seed Co dividend for FY11 ($2.3mn) as well as funds from disposal of investment property (estimated value $2.7mn). We have already seen evidence of volume growth with working capital availability – in November and December 2010, turnover doubled as a result of funding. Current indications from management are that output is improving slowly but more capital is needed to significantly boost production. The lead time to increase production is also at least 60 days (which is the shipping time for palm sterring, a key input for soap production). The Group is targeting $70-80mn for FY13-FY14.

Duties reinstated on oils

At the 1H11 budget announcement Finance Minister Tendai Biti reinstated duties on various basic goods, one of which was cooking oil (15% on soya bean cooking oil and 5% on palm cooking oil). Olivine has been unable to compete on price with imports but this protection should improve competitiveness slightly, and in turn boost sales and profitability, in our view. If output improves for other products such as margarines and soaps then we expect similar protection will be offered.

A number of constraints still exist:

Power supply disruptions: these result in downtime and low productivity, and we do not expect a solution to Zimbabwe's power deficit in the short term. Management has been looking at other options to solve the issue, such as generators, or installing a turbine in existing boilers to generate power. Such projects would involve capex, and given that working capital is likely to be the first priority we expect power to remain a concern in the short-to-medium term.

Soya bean supply: Olivine has crushing capacity of 70kt and 80kt for cotton seed and soya bean, respectively. Cotton seed is procured from Cottco (credit limits restrict supply) but local soya bean production is well below national requirements. Production is less than 20kt whereas the country needs about 220kt (according to Olivine's MD). Given the deficit of soya bean in the region, imports are also difficult to secure. Zambia and Malawi export but they have to satisfy local demand first, and as Zimbabwe is GMO-free, seed cannot be sourced from countries like SA and Brazil. Without a recovery in local production we think it could be difficult for Olivine to increase utilisation to full capacity. Management is looking at contracting its own farmers going forward.

Input cost inflation: commodity prices have escalated, soya was up to approximately $600/t in March 2011 and cotton seed had increased to $220/t (from $180/t) according to management. The palm sterring price has more than doubled. Some inflation was passed onto consumers, most likely due to a strong rand which made imports less competitive. However margins were impacted and going forward we think it will be difficult for Olivine to pass on costs, especially now we are seeing some weakness in the rand.

Expensive short-term funding and a long working capital cycle: Olivine has a long working capital cycle of 126 days, and we note mismatch between trade finance (270 days) and local borrowings (90 days) which has resulted in cash flow problems. Management believes the cash cycle could be reduced to 120 days if suitable short- or long-term funding is secured. Following the recent working capital injection, it expects to be operating with positive cash flow in the next few months.

Financial forecasts

We are cautious in our forecasts for this business because of its poor track record and failure to deliver on previous targets. We think the recent injection will help output but we expect most of the benefits will only accrue from FY13 onwards, given the lead time to increase production and significant working capital requirements. Based on 1H12 results (16 November) volumes are down YoY (19%) and utilisation remains low at 25-30%. We forecast 25% utilisation for the full year, improving to 35% in FY13 and eventually to 75% by FY16. We think management's target of $70mn-$80mn will only be achieved FY14-15.

Gross margins are growing off a low base and we expect a significant improvement over FY11 (which was 8%) as volumes improve. Management highlighted that margins in 3Q11 and 4Q11 were 16% and 18% respectively. Assuming cost pressures increase we conservatively estimate 15% for FY12E. By FY16 we think a 24.5% margin is achievable. Management thinks a small profit is possible in FY13 but we assume a small loss. We think a small profit is possible in FY14 and net margins may grow to 7.5% by FY16E.

Figure 169: Olivine financial forecasts

	FY11	FY12E	FY13E	FY14E	FY15E	FY16E	FY11-16E CAGR
Production, kt	37	38	53	68	90	113	25%
growth %		2%	40%	29%	33%	25%	
Utilisation, %	25%	25%	35%	45%	60%	75%	
Average price, $/t	1,026	1,232	1,269	1,307	1,346	1,386	6%
Growth		20%	3%	3%	3%	3%	
Revenue, $mn	38	46	67	88	121	156	33%
Internal sales, $mn	-2	-2	-3	-4	-6	-8	33%
AICO's 49% share, $mn	19	21	31	41	56	73	31%
Growth		16%	44%	32%	37%	29%	
Gross profit, $mn	1.5	3.2	5.4	8.2	12.5	17.8	64%
Growth		118%	68%	51%	53%	42%	
% revenue	8.0%	15.0%	17.5%	19.9%	22.2%	24.5%	
EBITDA	-2.2	-0.4	1.1	2.8	5.8	9.8	
Growth		-80%	-351%	162%	104%	70%	
% revenue	-11.7%	-2.0%	3.5%	6.9%	10.2%	13.5%	
EBIT	-3.8	-1.4	0.1	1.7	4.6	8.5	
Growth		-62%	-104%	2999%	164%	86%	
% revenue	-20.3%	-6.7%	0.2%	4.2%	8.1%	11.7%	
PBT	-5.0	-2.7	-1.3	0.5	3.3	7.3	
Growth		-46%	-53%	-136%	626%	119%	
% revenue	-27.0%	-12.6%	-4.1%	1.1%	5.9%	10.0%	
Net income	-4.1	-2.0	-0.9	0.3	2.5	5.5	
Growth		-50%	-53%	-136%	626%	119%	
% revenue	-22.0%	-9.4%	-3.1%	0.8%	4.4%	7.5%	

Source: Renaissance Capital estimates

Valuation

We use the same approach as for Cottco and Seed Co except we exclude the P/E multiples-based approach because we think Olivine will be loss-making in FY12 and FY13. Our comps consist of edible oil producers and we use average 2012E EV/EBITDA multiple of 6.0x (after applying a 20% discount because Olivine is loss-making). For our DCF we use a WACC of 21% (cost of equity 24%, after tax cost of debt 9%, target debt ratio 20%) and a long-term growth rate of 5%. Taking an average of these two approaches yields an equity value of $3.1mn.

Figure 170: Olivine DCF valuation

		Mar-12E	Mar-13E	Mar-14E	Mar-15E	Mar-16E	Mar-17E	Mar-18E
WACC used in DCF	21.0%							
OpFCF		-6.1	-6.0	-1.6	1.7	0.7	2.4	3.5
YoY			-2%	-73%	-206%	-60%	247%	46%
Discount factor		1.0	0.8	0.7	0.6	0.5	0.4	0.3
Discounted cash flows		(2.2)	(5.1)	(1.1)	1.0	0.3	1.0	1.1
Terminal value		7.5						
Discounted terminal value		7.1						
EV (Sum of discounted cash flows and terminal value)		2.1						
Net debt end 2011E		0.0						
Equity DCF fair value		2.1						

Source: Renaissance estimates

Figure 171: EV/EBITDA multiples-based valuation

2012E EV/EBITDA	6.0
2012E EBITDA	0.7
EV fair value, $mn	4.2
Net debt	0.0
Equity fair value	4.2

Source: Renaissance Capital estimates

Figure 172: Olivine fair value, $mn

DCF fair value	2.1
2012E EV/EBITDA based fair value	4.2
Average	**3.1**

Source: Renaissance Capital estimates

Figure 173: International edible oil comps

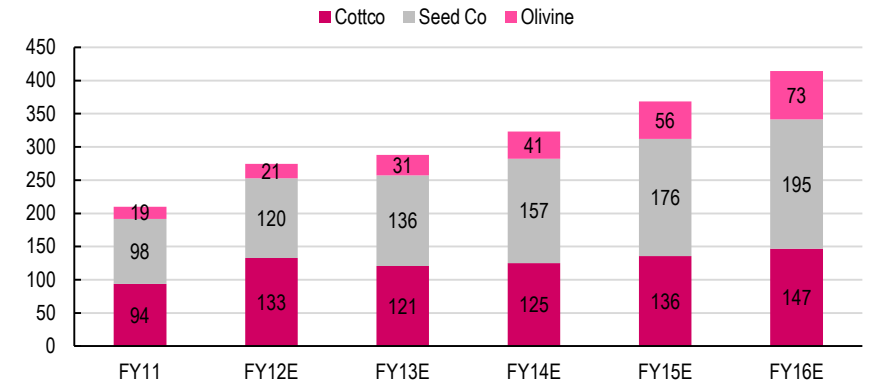
	P/E			EV/EBITDA		
	2011E	2012E	2012E	2011E	2012E	2012E
Wilmar	16.4	14.2	12.3	18.3	15.9	14.3
IOI Corporation	15.2	14.3	14.1	11.4	10.7	10.9
Archer-Daniels-Midland	9.8	9.2	8.6	7.8	7.3	7.4
Bunge	9.4	8.8	8.0	8.4	7.6	7.0
Kuala Lumpur Kepong	15.6	15.5	14.8	10.7	10.3	9.8
Golden Agri-Resources	12.8	13.2	11.9	7.4	7.6	6.9
China Agri-Industries	8.3	6.8	5.9	11.8	9.6	7.9
United Plantations	9.0	8.7	na	5.3	5.2	na
IJM Plantations	12.3	12.7	12.6	7.6	7.6	7.6
Agricola	16.1	15.5	14.5	7.8	7.3	7.3
Sipef	8.4	11.0	10.7	5.1	6.0	6.0
TSH Resources	11.8	11.3	10.2	10.1	9.6	8.8
TH Plantations	9.4	10.1	9.6	5.3	5.7	5.4
Chin Teck Plantations	7.9	7.7	7.7	5.8	5.4	5.4
Kwantas	6.5	6.0	na	6.8	6.0	na
Elstar Oils	neg	na	na	na	na	na
Zambeef (Lusaka)	8.7	4.4	3.2	13.7	5.9	4.8
Zambeef (AIM)	12.6	6.0	4.5	18.2	7.8	6.4
Feronia	na	5.4	3.0	na	1.7	1.0
Average	**11.6**	**10.1**	**9.6**	**8.7**	**7.5**	**7.2**
Discount	20%					
Discounted multiples	**9.3**	**8.1**	**7.7**	**7.0**	**6.0**	**5.7**

Source: Bloomberg, Renaissance Capital estimates

Group financial forecasts

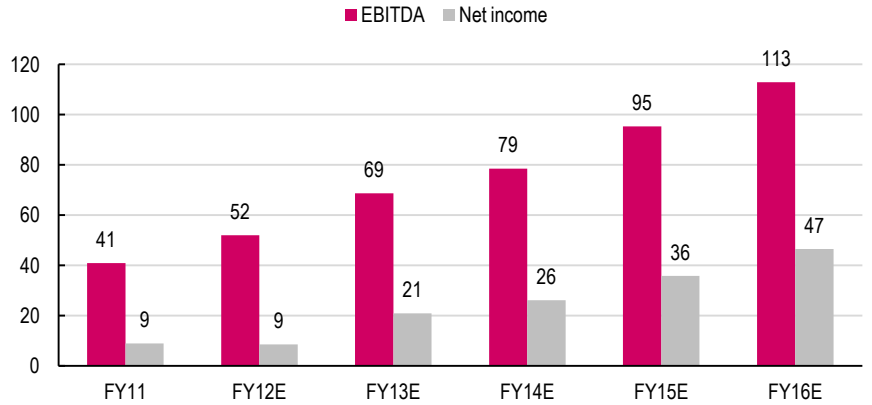
Combining our revenue forecasts for each business (and deducting internal revenue) we obtain a FY12 revenue forecast of $274mn, and we expect growth of 14.5% (CAGR FY11-16E) at the top line. We think gross margins may be slightly lower in FY12 (36.5%) vs FY11 (40.6%) driven by weaker margins at Cottco; but we think gross margins can grow to 42.8% by FY16. We expect the EBITDA margin to grow 8 ppts (to 27.3%), driven by improvements at all three businesses. Interest cover should improve following the reduction of debt at Cottco: we think it will improve to 7.5x in FY16 from 1.9x in FY11. Assuming an effective tax rate of 25% (7% in FY10-11) we expect the net margin to grow to 11.2% in FY16 (from 4.2% in FY11), and forecast growth of 39.1% (CAGR) at the bottom line (FY11-16E).

Figure 174: Revenue forecasts – split by business, $mn



Source: Renaissance Capital estimates

Figure 175: EBITDA and net income forecasts



Source: Renaissance Capital estimates

Group valuation

We use a SoTP methodology to value AICO. Summing the valuations we obtained for each business we obtain an equity value of $178mn. This gives a TP of $0.34/share which offers 72% potential upside. Looking at our set of agricultural comps and based on our 2012E estimates, AICO is trading at a substantial discount to its peers – 36% on P/E basis and 48% on EV/EBITDA basis. We have a **BUY** rating on AICO.

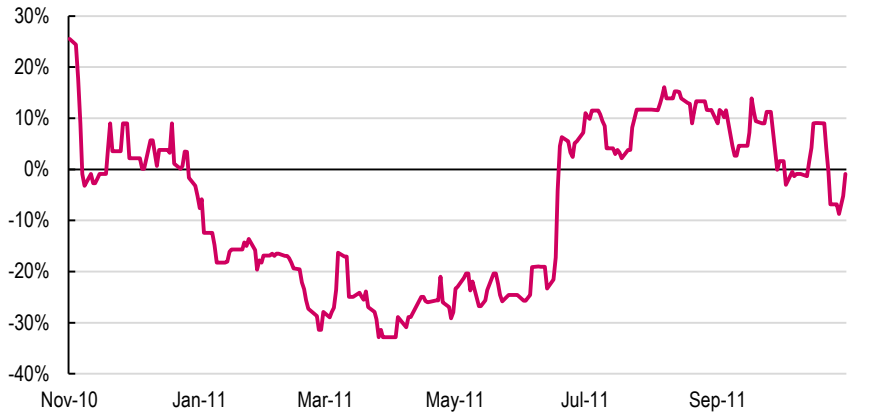
Figure 176: AICO SoTP valuation, $mn

Cottco	67.3
Seed Co	107.9
Olivine	3.1
Equity value	178.3
Shares in issue	531.0
TP	**0.34**
Current price	0.20
Upside potential	**72%**

Source: Renaissance Capital estimates

Looking at current market valuations for AICO and Seed Co, it appears the market places no value on Cottco or Olivine. AICO's current market cap is $104mn, Seed Co is $206mn which means that 51% is valued at $105mn (AICO's share in Seed Co). AICO's discount relative to Seed Co was even higher prior to announcement of AICO's FY11 results. While it has reduced, we still think the market is undervaluing this stock. We value Cottco at $67.3mn – 38% of our total valuation for AICO. We value AICO's share in Seed Co at $108mn (61% of our AICO valuation and in line with Seed Co's market valuation), therefore we think AICO should be trading much higher relative to Seed Co.

Figure 177: AICO premium (discount) to Seed Co



Source: Zimbabwe Stock Exchange

Appendix

Figure 178: AICO P&L, $mn

	FY10	FY11	FY12E	FY13E	FY14E	FY15E	FY16E	FY11E-16E CAGR
Revenue	162.9	210.6	274.3	288.2	323.3	368.5	414.1	14%
YoY		29.3%	30.2%	5.1%	12.2%	14.0%	12.4%	
Cost of sales	(109.4)	(125.1)	(174.3)	(169.1)	(188.1)	(212.3)	(237.0)	14%
YoY		14.4%	39.3%	-3.0%	11.2%	12.9%	11.6%	
% of net revenue	-67.1%	-59.4%	-63.5%	-58.7%	-58.2%	-57.6%	-57.2%	
Gross profit	53.5	85.5	100.0	119.1	135.2	156.2	177.1	16%
YoY		59.8%	16.9%	19.1%	13.4%	15.6%	13.4%	
GP margin, %	32.9%	40.6%	36.5%	41.3%	41.8%	42.4%	42.8%	
Other operating income	4.2	5.2	5.5	5.8	6.5	5.5	6.2	4%
YoY		23.7%	5.3%	5.1%	12.2%	-14.5%	12.4%	
Operating expenses	-37.7	-49.9	-53.5	-56.2	-63.0	-66.3	-70.4	7%
YoY		32.3%	7.3%	5.1%	12.2%	5.2%	6.1%	
% of net revenue	-23.1%	-23.7%	-19.5%	-19.5%	-19.5%	-18.0%	-17.0%	
EBITDA	20.1	40.9	52.0	68.7	78.6	95.4	112.9	23%
YoY		103.8%	27.2%	32.1%	14.4%	21.4%	18.4%	
EBITDA margin, %	12.3%	19.4%	19.0%	23.8%	24.3%	25.9%	27.3%	
Depreciation	(7.3)	(7.7)	(6.8)	(7.7)	(8.0)	(8.3)	(8.5)	2%
YoY		5.0%	-10.8%	13.5%	3.7%	3.3%	1.9%	
EBIT	12.8	33.2	45.2	60.9	70.6	87.1	104.5	26%
YoY		160.1%	35.9%	34.9%	15.8%	23.5%	19.9%	
EBIT margin, %	7.8%	15.8%	16.5%	21.1%	21.8%	23.6%	25.2%	
Net interest expense	-10.8	-17.2	-21.6	-18.1	-16.3	-15.5	-14.0	
YoY		58.7%	25.7%	-16.3%	-9.8%	-5.2%	-9.9%	
PBT	4.9	20.0	23.6	42.8	54.2	71.6	90.5	35%
YoY		310.6%	17.7%	81.9%	26.6%	32.1%	26.4%	
Tax	-0.3	-1.5	-5.9	-10.7	-13.6	-17.9	-22.6	73%
Effective tax rate, %	-7.0%	-7.2%	-25.0%	-25.0%	-25.0%	-25.0%	-25.0%	
PAT	4.5	18.6	17.7	32.1	40.7	53.7	67.9	30%
YoY		309.3%	-4.9%	81.9%	26.6%	32.1%	26.4%	
PAT margin, %	2.8%	8.8%	6.4%	11.1%	12.6%	14.6%	16.4%	
Minority interest	(6.7)	(8.5)	(9.0)	(11.2)	(14.5)	(17.9)	(21.4)	20%
YoY				24.1%	29.0%	23.3%	19.8%	
Net profit	(4.3)	8.9	8.6	20.9	26.2	35.9	46.5	39%
YoY		-309.5%	-3.7%	142.5%	25.2%	37.0%	29.7%	
Net profit margin, %	-2.6%	4.2%	3.1%	7.3%	8.1%	9.7%	11.2%	
YoY		-262.0%	-26.0%	130.8%	11.7%	20.2%	15.4%	
Total common dividend	0.0	0.0	0.0	6.9	8.6	11.8	15.3	

Source: Company data, Renaissance Capital estimates

Figure 179: AICO balance sheet, $mn

	FY10	FY11	FY12E	FY13E	FY14E	FY15E	FY16E	FY11E-16E CAGR
Property, plant & equipment	116.8	104.2	118.2	122.6	126.7	129.1	132.1	5%
Investment property	0.7	0.3	0.3	0.3	0.3	0.3	0.3	0%
Other	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0%
Non-current assets	**117.5**	**104.6**	**118.6**	**123.0**	**127.0**	**129.4**	**132.4**	**5%**
Inventories	37.4	55.3	76.4	69.5	72.2	81.4	90.9	10%
Inputs scheme receivables	9.7	21.4	16.9	20.5	22.1	23.9	25.8	4%
Trade and other receivables	29.9	43.0	56.4	59.2	66.4	75.7	85.1	15%
Prepayments for current assets	12.0	14.0	19.1	18.5	20.6	23.3	26.0	13%
Cash	3.4	-22.6	-18.8	-9.0	4.5	19.1	47.7	-216%
Other current assets	6.0	5.8	5.8	5.8	5.8	5.8	5.8	0%
Current assets	**98.4**	**116.8**	**155.7**	**164.5**	**191.6**	**229.2**	**281.2**	**19%**
Total assets	**215.9**	**221.4**	**274.3**	**287.5**	**318.6**	**358.6**	**413.6**	**13%**
Share capital	0.0	5.3	5.3	5.3	5.3	5.3	5.3	0%
Capital reserves	52.5	33.0	33.0	33.0	33.0	33.0	33.0	0%
Retained earnings	29.9	42.2	50.9	64.9	82.4	106.4	137.6	27%
Equity attributable to equity holders of the parent	82.5	80.6	89.2	103.2	120.8	144.8	175.9	17%
Minority interest	32.1	36.0	45.0	56.2	70.7	88.6	110.0	25%
Total equity	**114.6**	**116.6**	**134.2**	**159.5**	**191.5**	**233.4**	**285.9**	**20%**
Long-term borrowings	0.0	14.5	21.9	18.7	16.0	14.6	15.2	1%
Deferred tax	26.0	18.8	18.8	18.8	18.8	18.8	18.8	0%
Other	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0%
Non-current liabilities	**26.2**	**33.5**	**40.8**	**37.7**	**35.0**	**33.6**	**34.2**	0%
Borrowings	48.5	47.4	66.2	58.1	56.8	52.4	50.1	1%
Trade & other payables	20.6	19.5	28.7	27.8	30.9	34.9	39.0	15%
Current tax liability	4.6	3.4	3.4	3.4	3.4	3.4	3.4	0%
Other current liabilities	1.4	1.1	1.1	1.1	1.1	1.1	1.1	0%
Current liabilities	75.1	71.3	99.3	90.3	92.1	91.7	93.5	6%
Total equity & liabilities	**215.9**	**221.4**	**274.3**	**287.5**	**318.6**	**358.6**	**413.6**	13%

Source: Company data, Renaissance Capital estimates

Figure 180: AICO cash flow statement, $mn

	FY12E	FY13E	FY14E	FY15E	FY16E
EBIT	45.2	60.9	70.6	87.1	104.5
Tax on EBIT	-11.3	-15.2	-17.6	-21.8	-26.1
NOPLAT	33.9	45.7	52.9	65.3	78.4
D&A	6.8	7.7	8.0	8.3	8.5
Change in NWC	-26.0	0.2	-10.5	-19.0	-19.4
Capex	-20.8	-12.1	-12.1	-10.7	-11.5
% of gross sales	-8%	-4%	-4%	-3%	-3%
OpFCF	-6.1	41.5	38.4	43.9	56.0
YoY		-777%	-8%	14%	27%
Dividends	0.0	-6.9	-8.6	-11.8	-15.3
Financial costs	-21.6	-18.1	-16.3	-15.5	-14.0
Borrowings	26.2	-11.2	-4.0	-5.8	-1.6
Capital increase	0.0	0.0	0.0	0.0	0.0
Tax adjustments	5.4	4.5	4.1	3.9	3.5
Other	0.0	0.0	0.0	0.0	0.0
FCF	3.8	9.8	13.5	14.6	28.5
YoY		157%	37%	9%	95%

Source: Company data, Renaissance Capital estimates

Agriculture
Democratic Republic of Congo

Company report
Equity Research
21 November 2011

Renaissance Capital

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Feronia
Challenging times

- **Palm oil fundamentals are strong.** Palm oil demand in China and India remains robust. As local supply is virtually non-existent, their imports are also increasing. Simultaneously, global supply growth is limited by environmental concerns in the major producers, Indonesia and Malaysia, giving support to prices and attracting investor interest in alternative supply sources such as the DRC.
- **The DRC has long-term potential as an agriculture destination.** Described as "a new Brazil" by one agronomist, the DRC has the potential to emerge as a major agricultural producer. Its fertile soils, abundant water resources and favourable climate can support three crops a year, including cereals and oilseeds – affording a degree of diversification. We see the DRC as a key country inside the BAC axis.
- **Execution risks remain considerable.** While Feronia has rehabilitated two oil palm mills and its estate roads, progress on increasing production has not been satisfactory. Similarly, planting of rice, beans and millets has been problematic and we feel that the company lacks management depth in its nascent arable operation.
- **And the DRC is as risky as ever.** Long-term potential doesn't detract from the short-term risks of doing business in the DRC. Civil strife, poor infrastructure and corruption are a few impediments although, under the current administration, substantial progress has been made on stabilising the country.
- **BUY maintained.** We have revised our forecasts to reflect a slower rollout in palm and arable operations. Our DCF-derived fair value, with a WACC of 25%, comes to CAD0.39, implying 73% upside potential to current price. For scenarios with WACC ranging from 20% to 30%, and with a pessimistic scenario considering only palm operations, the fair value range comes to CAD0.23 to CAD0.69.

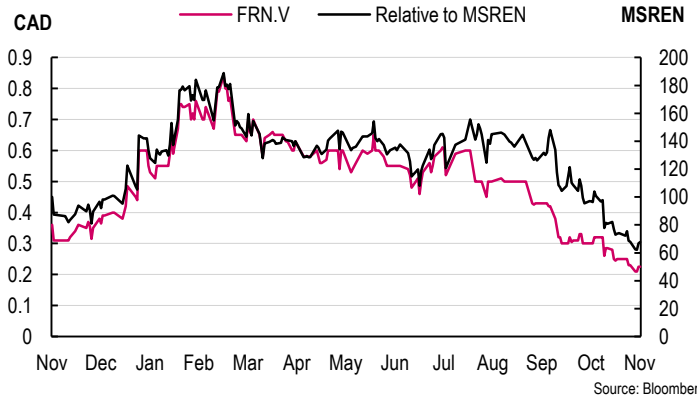
Report Date	**21 November 2011**
Rating common	BUY
Target Price (comm), CAD	0.390
Current price (comm), CAD	0.225
MktCap, CADmn ($mn)	32.6 ($31.8)
EV, CADmn ($mn)	28.5 ($27.8)
Reuters	FRN.V
Bloomberg	FRN CN Equity
ADRs/GDRs per common share	na
Common shares outstanding, mn	209.455481
Change from 52-week high:	-73%
Date of 52-week high:	03 March 2011
Change from 52-week low:	0%
Date of 52-week low:	17 Nov 2011
Web:	www.feronia.com
Free float in $mn	$32mn
Major shareholder	Na
With shareholding	Na
Average daily traded volume in $mn	Na
Share price performance over the last 1 month	-54%
3 months	-60%
12 months	-44%

Summary valuation and financials, INRmn

	Revenue	EBITDA	Net income	EPS, $	DPS, $	EBITDA margin	EV	Net debt	EV/Sales	EV/CF	EV/EBITDA	P/E	P/B	Div yield	RoIC/ WACC
2010	4	-5	-7	-0.09	0.00	-130%	40	-9	7.1	nm	nm	nm	nm	0%	nm
2011E	11	-4	-7	-0.04	0.00	-41%	28	-22	2.6	nm	nm	nm	1.2	0%	-3.4
2012E	37	16	9	0.04	0.00	43%	34	-15	0.8	nm	1.7	5.4	1.1	0%	2.5
2013E	54	28	16	0.08	0.00	51%	34	-15	0.5	33.3	1.0	3.0	0.7	0%	2.2

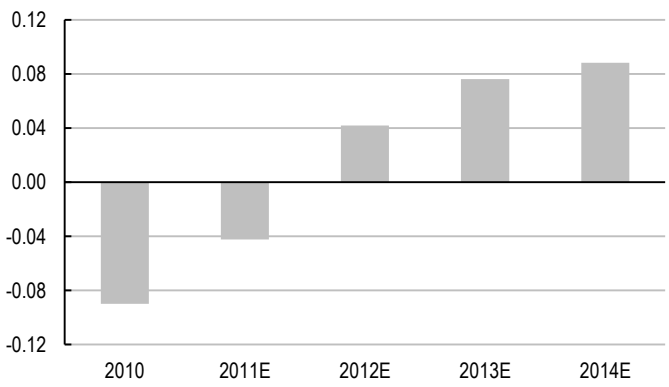
Source: Renaissance Capital estimates

Figure 181: Price performance – 52 weeks



Source: Bloomberg

Figure 182: Feronia EPS forecast



Source: Bloomberg

Investment summary

Despite the recent turbulence in financial markets and the global economy, the outlook for the palm oil sector remains robust. A recently as October, Malaysian palm oil exports rose 19% m-m and reached a record high of 1.84mnt, indicating the resilience of this particular sub-sector. Palm oil remains the most widely consumed vegetable oil in the world, accounting for a little less than one-third of the global vegetable oil consumption. Most of it is used for cooking purposes, while some is used for biodiesel. Moreover, in recent years, palm oil has been the fastest-growing vegetable oil – global consumption of palm oil has nearly doubled over the past decade.

The main drivers of this demand are the emerging economies of China and India both of which have to import palm oil in quantity to satisfy growing demand. Together they accounted for 28% of global consumption and 35% of global imports in 2010/11, according to the USDA. There are a number of macro factors which play a part in demand all of which are covered in the macro sections of this report: urbanisation, economic growth and population growth. However, another key driver of palm oil demand is the relative stagnation in China's output in other oilseeds such as soybeans, where output has been almost static for well over a decade and palm oil imports have filled the gap.

In the same way that it is two major markets that are driving overall growth in the sector, supply is similarly concentrated. Indonesia and Malaysia combined account for approximately 87% of global palm oil output and both are facing a combination of natural and environmental constraints on future expansion. Supply is further restricted by the fact that the most effective way to grow palm oil is near the Equator, it takes three years to get a first crop from the plant and it takes several more years for that yield to peak. Thus there is a considerable lag effect. The emergence of alternative suppliers to SE Asia has become evident across Africa with expanding businesses across the DRC, Liberia, the Ivory Coast, Cameroon, Ghana, Nigeria and Sierra Leone as well as in Brazil.

Feronia's key strategic advantage arises from the fact that originally the business was an existing brownfield operation formerly owned and managed by a division of Unilever. Two unique advantages came with the ownership of those assets: first, an existing infrastructure and workforce was in place – a decided advantage over agricultural greenfield developments and second, these operations were so immaterial to the overall Unilever business that a sale was conducted on favourable terms to the buyers.

As part of a wider strategy the company has embarked on the creation of a diversified agricultural enterprise and thus will not restrict its activities to palm oil. Diversification of revenues across agricultural commodities is a widely desired but rarely achieved objective, as crops that grow well in a particular agro-ecological zone tend to behave in a correlated manner. However, DRC's soils and climate offer the possibility of growing relatively uncorrelated crops such as long-gestation palm and short-gestation rice. It is to exploit this opportunity that Feronia has embarked on a plan to triple crop rice, beans and millet, thus diversifying its risk to a large extent.

However, agricultural theory as dreamt up by analysts, commentators and strategists is one thing, and agricultural practice is quite another. While we know the possible risk diversification that will likely emerge over the long term from this strategy, it doesn't detract from the fact that triple cropping crops such as rice, beans

and millet is an entirely different proposition to the long-term growth cycle and cashflows that emerge from palm oil plantations. The tendency in agriculture is to pin all those products under a single agriculture banner for the sake of descriptive convenience. However we wouldn't necessarily see an automobile manufacturer as necessarily a good shipbuilder despite the fact that they both come under the transport equipment manufacturer.

Thus, Feronia is going through a stage in its development when it has to balance four objectives some of which may be mutually exclusive: a long-term growth strategy, a need for earnings visibility, a diversification strategy across a range of crops and, possibly, a strategy to diversify from DRC-centric risk.

This is not an easy path at the best of times. For instance, the company had planned to increase its palm yields to 6 t/ha and produce 18,000 tonnes of crude palm oil (CPO) by the end of this year. However, both these objectives are unlikely to be achieved due to a delay in rehabilitation activities. While a delay in progress is obviously not desirable, we do not think it is a cause for concern as such problems are fairly common in agriculture and in Africa. We, however, do downgrade our forecasts to reflect these delays.

In common with all agriculture companies, Feronia faces difficulties in generating regular returns. The transition from a palm oil producer to a diversified agricultural producer will have many pitfalls along the way. The need for large amounts of capital expenditure, dependency on the weather and poor support infrastructure are all factors that have to be tackled effectively.

Along with the execution risks, Feronia faces adverse country risk. The DRC is a difficult business environment. The east of the country remains mired in conflict. The Congo River's waterways are the dominant mode of transport, and road and rail infrastructure remain inadequate.

As Feronia's progress since its fundraising in March has been slower than expected, we have downgraded our forecasts. In the palm business, we are reducing yield improvements and oil extraction rates. In the agriculture business we are slowing the operational rollout.

The key challenge is to find suitable benchmarks for the company. As we note in the valuation section of this note, applying WACCs between 20% and 30% and three scenarios based simply on a decent outlook for palm and arable and one which is less optimistic and strips out the arable operation in its entirety results in a valuation range between CAD0.23 and CAD0.69. The challenge is that these extremes do not represent extremes – both are equally valid. Do not be surprised if we see both extremes in the following 12-18 months.

On our valuation, the company trades at FY12 EV/EBITDA of 4.9x, representing a 71% discount to global palm oil peers average of 8.4x. However, given Feronia's higher risk profile and the fact that it is at a very early stage in its palm operation expansion, we believe such a large discount is not unjustified.

Operational update

Feronia's palm oil assets comprise more than 101,000 ha of land and 2mn mature trees, centred on three estates formerly owned by Unilever and established in 1911. Currently, only about 12,000 ha of palm is mature and in production, with around 4,000 ha consisting of immature oil palms. Since the plantation was once producing on 55,000 ha, Feronia intends to slowly increase the area under mature palms.

On the arable side, the company has cleared nearly 2,000 ha of farmland that is now ready for planting. Feronia intends to take full advantage of the DRC's geographic and climatic features by planting three crops a year – rice in September-February; beans in February-May; and millet and beans in May-September. However, this year, the company has only conducted trials and small-scale cultivation for the purpose of seeds.

The table below lists Feronia's objectives as specified at the time of its listing, and the progress on those objectives, at the end of 30 June 2011. As can be seen, the progress has been slower than planned. While the company has managed to rehabilitate estate roads and its two oil palm mills, production is behind initial estimates. Similarly, Feronia's target of producing and selling rice, beans and millets has been postponed from 2011 to 2012.

Figure 183: Feronia objectives and current status

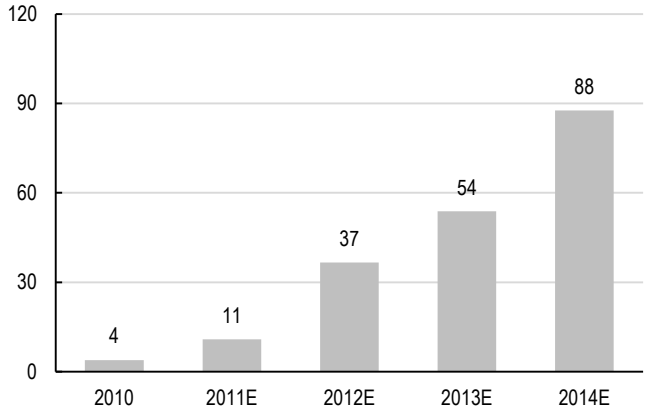
Objectives	Status
Oil palm – 2010	
Rehabilitate two oil palm mills, restoring them back to their rated capacity of 10 tonnes of Fresh Fruit Bunches (FFB) per hour	Completed
Rehabilitate the estate roads and engage additional transport contractors to transport the FFB to the mill for processing	Completed
Rehabilitate the plantations at the Yaligimba estate and have equipment in place to enable FFB from Yaligimba estate, DRC to be transported by barge to Lokutu for processing (with an estimated 4,500 ha of mature plantations being brought back into production)	Completed
Plant an additional 1,000 ha of new oil palms	Completed
Place an order for a new oil palm mill for the Yaligimba estate, DRC	Not completed. The company has placed an order for a larger mill for the Yaligimba estate in 2011
Produce approximately 8,500 tonnes of CPO	Not completed due to delay in commencement of rehabilitation activities
Oil palm – 2011	
Produce approximately 18,000 tonnes of CPO	The company expects that 10,000 tonnes of CPO and 400 tonnes of PKO will be produced in 2011
Plant an additional 1,000 ha of new oil palms	Objective has changed and increased to 2,000 ha
Arable – 2010	
Clear and plant 1,000 ha of rice in Bas Congo, DRC	Not completed. Completion is expected in 2011
Establish a drying and processing plant to process the crop in Bas Congo, DRC	Not completed. Completion is expected in 2011
Arable – 2011	
Harvest, process and sell approximately 4,000 tonnes of rice, 2,400 tonnes of edible beans and 800 tonnes of millet	Completion is expected in 2012 as rice will be sown in 4Q11 and harvested in 1Q12. Beans to be sown 1Q12, harvested in 2Q/3Q12 and millet to be sown and harvested in 3Q12
Clear and plant an additional 1,000 ha of land with rice in Bas Congo, DRC to reach total production area of 2,000 ha	Objective has not changed

Source: Company data

While we do not think this warrants a change in our long-term forecasts, we do downgrade our assumptions of operational parameters such as yields, oil extraction rates and area cropped in the short term to reflect Feronia's slow progress.

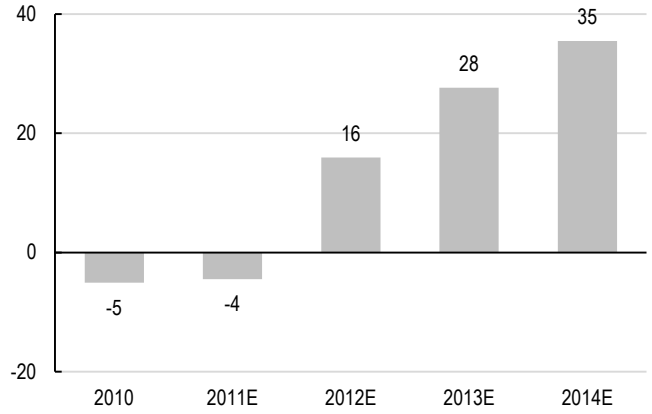
Forecasts

Figure 184: Revenue forecast, $mn



Source: Renaissance Capital estimates

Figure 185: EBITDA forecast, $mn



Source: Renaissance Capital estimates

Figure 186: Palm operations summary, $mn

Year-end 31 December	2011E	2012E	2013E	2014E	2015E
Planted area - including out-growers (ha)	16,635	21,635	25,744	29,716	33,503
Planted area under mature palm (ha)	11,995	12,744	14,244	14,716	18,503
Average FFB yield (t/ha)	4.5	10.0	11.4	10.9	9.6
Gross harvest of FFB ('000 tonnes)	54.0	128.0	162.7	160.2	177.7
CPO extraction rate (%)	17.5%	21.0%	22.5%	22.5%	22.5%
PKO extraction rate (%)	0.7%	1.1%	1.1%	1.1%	1.1%
CPO production ('000 tonnes)	9.5	26.9	36.6	36.0	40.0
PKO production ('000 tonnes)	0.4	1.3	1.7	1.7	1.9
CPO average price ($/tonne)	990	1,000	1,000	1,000	1,000
PKO average price ($/tonne)	1,287	1,300	1,300	1,300	1,300
CPO revenue ($mn)	9	27	37	36	40
PKO revenue ($mn)	1	2	2	2	2
Seeds revenue ($mn)	1	1	1	1	1
Total revenue ($mn)	**11**	**30**	**40**	**39**	**43**
EBITDA ($mn)	**0**	**14**	**23**	**21**	**20**
EBITDA margin	-3%	48%	58%	54%	46%
EBIT ($mn)	**-2**	**12**	**19**	**15**	**11**
EBIT margin	-18%	39%	48%	39%	26%

Source: Renaissance Capital estimates

Figure 187: Arable operations summary, $mn

Year-end 31 December	2011E	2012E	2013E	2014E	2015E
Planted area under					
Rice (first crop)	0	2,000	4,000	14,000	24,000
Edible beans (second crop)	0	2,000	4,000	14,000	24,000
Rice (second crop)	0	0	0	0	0
Millet (third crop)	0	1,000	2,000	7,000	12,000
Edible beans (third crop)	0	400	800	2,800	4,800
Total planted area (ha)	**0**	**5,400**	**10,800**	**37,800**	**64,800**
Yield (t/ha)					
Rice (first crop)	2.8	3.0	3.3	3.7	3.8
Edible beans (second crop)	1.1	1.2	1.3	1.5	1.5
Rice (second crop)	2.8	3.0	3.3	3.7	3.8
Millet (third crop)	0.9	1.0	1.1	1.2	1.2
Edible beans (third crop)	0.8	0.8	0.9	1.0	1.1
Gross harvest ('000 tonnes)					
Rice (first crop)	0	6	13	51	92
Edible beans (second crop)	0	2	5	20	37
Rice (second crop)	0	0	0	0	0
Millet (third crop)	0	1	2	8	15
Edible beans (third crop)	0	0	1	3	5
Total harvest ('000 tonnes)	**0**	**10**	**22**	**83**	**149**
Rice average price ($/tonne)	623	530	477	429	429
Edible beans average price ($/tonne)	1,457	1,238	1,115	1,003	1,003
Millet average price ($/tonne)	525	446	402	361	361
Rice revenue ($mn)	0	3	6	22	40
Edible beans revenue ($mn)	0	3	7	23	42
Millet revenue ($mn)	0	0	1	3	5
Total revenue ($mn)	**0**	**7**	**14**	**48**	**87**
EBITDA ($mn)	**-4**	**2**	**5**	**14**	**31**
EBITDA margin		25%	33%	29%	35%
EBIT ($mn)	**-4**	**1**	**3**	**9**	**20**
EBIT margin		16%	19%	19%	23%

Source: Renaissance Capital estimates

Valuation

We have used the DCF method to value the company. Feronia's DCF-derived equity value at the end of 2011, after accounting for minority interests, comes to $78mn, implying a per-share value of CAD0.39, about 73% above the current market price of CAD0.225.

Figure 188: Feronia DCF, $mn

	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
EBIT	(6)	13	22	24	32	53	92	134	156	183	200	216	234	251	271	291
NOPLAT	(6)	13	22	24	32	53	55	80	93	110	120	129	140	151	163	175
Depreciation	2	3	6	11	19	27	34	41	45	43	44	44	43	41	39	36
Change in w. cap	(2)	(3)	(3)	(12)	(12)	(15)	(21)	(24)	(5)	(5)	(2)	(2)	(1)	(2)	(2)	(2)
Capex	(6)	(18)	(24)	(59)	(71)	(67)	(77)	(92)	(34)	(38)	(50)	(41)	(37)	(24)	(22)	(27)
FCFF	**(13)**	**(5)**	**1**	**(36)**	**(32)**	**(2)**	**(10)**	**6**	**99**	**110**	**111**	**130**	**145**	**166**	**177**	**181**
Discount factor		0.80	0.64	0.51	0.41	0.33	0.26	0.21	0.17	0.13	0.11	0.09	0.07	0.05	0.04	0.04
Discounted FCFF		(4)	1	(18)	(13)	(1)	(3)	1	17	15	12	11	10	9	8	6
Sum of discounted FCFF	51															
Terminal value	27															
Enterprise value	**78**															
Minority interest	18															
Net debt 2011E	(22)															
Equity value	82															
No. of shares	209															
Fair value ($)	0.39															
Fair value (CAD)	**0.39**															

Source: Renaissance Capital estimates

We have also conducted an analysis to examine a few likely scenarios. As seen in Figure 189, we imagine three scenarios with WACCs varying from 20% to 30%. In the last scenario, pessimistic, we value only Feronia's palm operations, and completely remove any arable contribution to the valuation. This throws up a range of CAD0.23 to CAD0.69. As we noted in the investment summary, this range is not merely academic – the share price could easily test these extremes.

Figure 189: Scenario analysis

	Optimistic	Neutral	Pessimistic
WACC	20%	25%	30%
Operations included in valuation	Palm and Arable	Palm and Arable	Palm only
Fair value per share (CAD)	0.69	0.39	0.23

Source: Renaissance Capital estimates

On relative terms, our EV of $78mn implies a 2012E EV/EBITDA multiple of 4.9x. This is a 71% discount to global palm oil peers. On its current EV, Feronia is trading at a 2012E EV/EBITDA of 1.7x, or approximately at one fifth of that of its peers.

Figure 190: Feronia peer valuation

	Country	MktCap. $mn	EV $mn	P/E 2011E	P/E 2012E	EV/EBITDA 2011E	EV/EBITDA 2012E
Sime Darby Bhd	Malaysia	16,947	19,302	13.8	13.5	9.1	8.8
IOI Corp Bhd	Malaysia	10,358	11,423	15.3	14.5	11.5	10.9
Kuala Lumpur Kepong Bhd	Malaysia	7,124	7,507	15.7	15.5	10.7	10.4
United Plantations BHD	Malaysia	1,207	1,019	9.6	9.3	5.7	5.5
IJM Plantations Bhd	Malaysia	666	602	12.7	13.0	7.5	7.6
Tradewinds Plantation Bhd	Malaysia	604	873	7.2	8.2	5.0	5.5
Wilmar International Ltd	Singapore	25,800	46,599	15.4	13.2	18.0	15.5
Golden Agri-Resources Ltd	Singapore	6,339	7,057	9.8	9.9	7.0	6.9
Astra Agro Lestari Tbk PT	Indonesia	3,972	3,854	13.5	13.5	8.5	8.5
Sampoerna Agro PT	Indonesia	639	634	9.4	9.7	5.8	5.8
Bakrie Sumatera Plantations Tbk PT	Indonesia	439	1,292	6.9	6.5	6.8	6.6
Average				**11.8**	**11.5**	**8.7**	**8.4**

Source: Bloomberg, Renaissance Capital estimates

Financial statements

Figure 191: Feronia summary financials, Dec YE

Income statement, $mn	2010	2011E	2012E	2013E	2014E
Revenue	3.9	10.9	36.7	53.8	87.6
Cost of sales	(2.3)	(12.2)	(17.1)	(22.4)	(46.4)
SG&A expenses	(6.6)	(3.1)	(3.7)	(3.8)	(5.7)
EBITDA	**(5.1)**	**(4.4)**	**15.9**	**27.6**	**35.5**
Depreciation and amortisation	(0.1)	(1.7)	(3.3)	(6.0)	(11.3)
EBIT	**(5.2)**	**(6.2)**	**12.6**	**21.6**	**24.2**
Interest income	0.0	0.1	0.2	0.2	0.2
Interest expense	(0.1)	(0.1)	(0.1)	(0.1)	(1.0)
Other income	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)
Profit before tax and minorities	**(6.4)**	**(7.2)**	**11.7**	**20.6**	**22.2**
Income tax	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
Profit before minorities	**(6.5)**	**(7.4)**	**11.5**	**20.5**	**22.1**
Minority interests	0.0	0.0	(2.7)	(4.5)	(3.6)
Net profit/(loss) for period	**(6.5)**	**(7.4)**	**8.8**	**15.9**	**18.5**

Cash flow statement, $mn	2010	2011E	2012E	2013E	2014E
Net profit / (loss) before minorities	(6.5)	(7.4)	11.5	20.5	22.1
Depreciation and amortization	0.1	1.7	3.3	6.0	11.3
Financial charges	1.3	0.0	(0.1)	(0.1)	0.8
Cashflow before change in w.cap	**(5.1)**	**(5.7)**	**14.7**	**26.4**	**34.2**
Decrease / (increase) in inventories	(0.4)	(1.0)	(0.8)	(2.1)	(11.4)
Decrease / (increase) in receivables	0.1	(0.6)	(2.1)	(1.4)	(2.8)
Increase / (decrease) in accounts payable	(0.3)	(2.4)	0.4	0.4	2.0
Increase in other assets	(0.7)	0.0	0.0	0.0	0.0
Increase in other liabilities	(1.4)	0.0	0.0	0.0	0.0
Cashflow from operations	**(7.8)**	**(9.7)**	**12.2**	**23.3**	**22.1**
Purchase/(sale) of fixed assets	(3.6)	(6.4)	(18.4)	(23.7)	(59.3)
Cashflow from investing	**(3.6)**	**(6.4)**	**(18.4)**	**(23.7)**	**(59.3)**
Proceeds from issue of shares	19.8	28.8	0.0	0.0	0.0
Increase/(decrease) in loans	0.0	0.0	0.0	0.0	40.0
Financial charges	0.0	(0.0)	0.1	0.1	(0.8)
Dividends paid	0.0	0.0	0.0	0.0	0.0
Cashflow from financing	**19.8**	**28.8**	**0.1**	**0.1**	**39.2**
Effects of foreign exchange	0.0	0.0	0.0	0.0	0.0
Change in cash	**8.4**	**12.7**	**(6.1)**	**(0.3)**	**1.9**
Cash at beginning of period	0.5	8.9	21.6	15.5	15.1
Cash at end of period	**8.9**	**21.6**	**15.5**	**15.1**	**17.1**

Per share data	2010	2011E	2012E	2013E	2014E
Number of shares - basic	99	145	145	145	145
Number of shares - diluted	140	209	209	209	209
EPS - basic	(0.09)	(0.06)	0.06	0.11	0.13
EPS - diluted	(0.09)	(0.04)	0.04	0.08	0.09
DPS	0.00	0.00	0.00	0.00	0.00
BVPS - diluted		0.19	0.21	0.31	0.42
FCFF - diluted		(0.07)	(0.02)	0.00	(0.17)

Growth rates, %	2010	2011E	2012E	2013E	2014E
Revenue		178%	238%	47%	63%
EBITDA		-13%	-458%	73%	28%
EBIT		18%	-305%	71%	12%
Net Income		13%	-219%	82%	16%
EPS		-53%	-199%	82%	16%

Balance sheet ratios, %	2010	2011E	2012E	2013E	2014E
Debt / equity	0%	0%	0%	0%	46%
Debt / capital	0%	0%	0%	0%	31%
Net debt / equity	-75%	-65%	-35%	-23%	26%
Net debt / EBITDA	175%	486%	-97%	-55%	65%

Balance sheet, $mn	2010	2011E	2012E	2013E	2014E
Fixed assets	11.1	15.7	30.9	48.6	96.6
Other non-current assets	0.0	0.0	0.0	0.0	0.0
Non-current assets	**11.1**	**15.7**	**30.9**	**48.6**	**96.6**
Cash and cash equivalents	8.9	21.6	15.5	15.1	17.1
Inventories	1.2	2.2	3.0	5.1	16.5
Receivables	0.3	0.9	3.0	4.4	7.2
Prepaid expenses	1.0	1.0	1.0	1.0	1.0
Other current assets	0.0	0.0	0.0	0.0	0.0
Current assets	**11.4**	**25.7**	**22.5**	**25.7**	**41.7**
Total assets	**22.5**	**41.5**	**53.4**	**74.3**	**138.3**
Shareholder's equity	11.9	40.7	40.7	40.7	40.7
Reserves	0.0	(7.4)	1.4	17.3	35.8
Minority interests	0.0	0.0	2.7	7.2	10.9
Total equity	**11.9**	**33.3**	**44.8**	**65.2**	**87.3**
Long-term debt	0.0	0.0	0.0	0.0	40.0
Deferred income tax	0.8	0.8	0.8	0.8	0.8
Other non-current liabilities	6.1	6.1	6.1	6.1	6.1
Non-current liabilities	7.0	7.0	7.0	7.0	47.0
Accounts payable	3.4	1.0	1.4	1.8	3.8
Short-term debt	0.0	0.0	0.0	0.0	0.0
Other current liabilities	0.2	0.2	0.2	0.2	0.2
Current liabilities	**3.6**	**1.2**	**1.6**	**2.0**	**4.0**
Total liabilities	**10.6**	**8.2**	**8.6**	**9.0**	**51.0**
Total equities & liabilities	**22.5**	**41.5**	**53.4**	**74.3**	**138.3**

Performance ratios, %	2010	2011E	2012E	2013E	2014E
EBITDA margin	-130%	-41%	43%	51%	40%
EBIT margin	-134%	-57%	34%	40%	28%
Net Income margin	-167%	-68%	24%	30%	21%
RoAA		-19%	27%	34%	23%
RoAE		-33%	29%	37%	29%
RoIC		-84%	62%	54%	30%
RoIC/WACC	nm	(3.4)	2.5	2.2	1.2

Valuation ratios	2010	2011E	2012E	2013E	2014E
P / E (x) - basic	nm	nm	3.7	2.0	1.8
P / E (x) - diluted	nm	nm	5.4	3.0	2.5
P / FCFF (x) - diluted	nm	nm	nm	56.4	nm
P / B (x) - diluted	nm	1.2	1.1	0.7	0.5
EV / sales (x)	7.1	2.6	0.8	0.5	0.3
EV / EBITDA (x)	nm	nm	1.7	1.0	0.8
EV / FCFF (x)	nm	nm	nm	33.3	nm
Dividend yield (%)	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Company data, Renaissance Capital estimates

Agriculture
India/Africa

Company report
Equity Research

21 November 2011

Renaissance Capital

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Karuturi Global
Flower power

- **Strong floriculture business should set a floor for valuation.** With an annual production of over 600mn stems and a 9% market share in the European cut-flowers market, Karuturi has a strong market position in the floriculture business. Given that the global cut-flowers industry is relatively recession-resistant, Karuturi's floriculture business should set a floor for Karuturi's valuation.
- **Africa macro story and Ethiopian advantages intact.** The macro case for African agriculture is well known and investment flows into the sector and the continent will continue to grow. Fertile land, low costs and a large local market in Ethiopia are obvious. Karuturi's choice of Ethiopia as its hub remains a smart strategic move – ideal climatic conditions, favourable government policies, tariff-free import status with the EU, and proximity to large food-deficit East-African markets are all in evidence.
- **However, execution risks are significant.** Agriculture comes with significant risks attached. Arguably the biggest risk and one that can probably never be mitigated completely is weather. Karuturi got more than a taste of weather related risk, when its first major harvest in Gambella, Ethiopia, spread over 12,000 ha was completely lost due to flash floods, and the company had to recognise losses of INR368mn ($7.2mn).
- **BUY maintained.** To better reflect the current market risk perception, we have assumed higher WACCs than we did at the time of our initiation in May 2011 – higher by 300 to 500bps for the different businesses. Considering only the floriculture businesses, our forecasts suggest a fair value of INR8.58/share. This, we believe, should provide a floor to the share price. Adding the agricultural business gives us a target price of INR10.58/share, implying 125% upside potential over the current market price.

Report date:	**21 November 2011**
Rating common	**BUY**
Target price (comm), INR	10.58
Current price (comm), INR	4.70
MktCap, INRmn ($mn)	3,786 (74)
EV, INRmn ($mn)	7,866 (155)
Reuters	KART.BO
Bloomberg	KARG IN Equity
ADRs/GDRs since	October 2010
ADRs/GDRs per common share	3 shares = 1 GDR
Common shares outstanding, mn	805.50701
Change from 52-week high:	-85%
Date of 52-week high:	24 Nov 2010
Change from 52-week low:	+13%
Date of 52-week low:	24 Oct 2011
Web:	www.karuturi.com
Free float in $mn	61
Major shareholder	am Karuturi
with shareholding	18.15%
Average daily traded volume in $mn	na
Share price performance over the last 1 month	-14%
3 months	-4%
12 months	-84%

Summary valuation and financials, INRmn

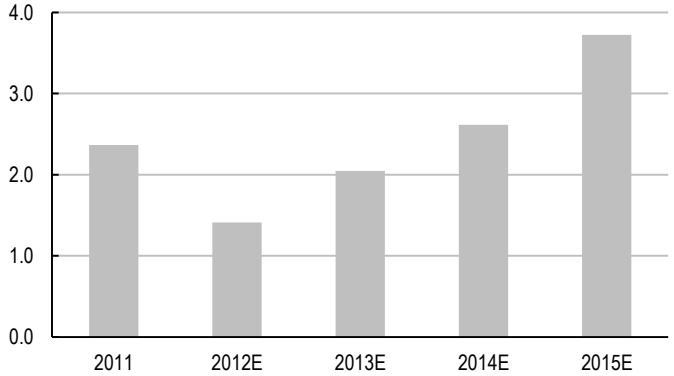
	Revenue	EBITDA	Net income	EPS, INR	DPS, INR	EBITDA margin	EV	Net debt	EV/Sales	EV/CF	EV/ EBITDA	P/E	P/B	Div yield	RoIC/ WACC
2011	6,387	2,383	1,550	2.36	0.10	37%	7,866	4,108	1.2	nm	3.3	2.0	0.2	2.1%	0.5
2012E	7,063	2,613	1,285	1.41	0.10	37%	10,143	6,385	1.1	nm	3.0	3.3	0.3	2.1%	0.5
2013E	8,838	3,034	1,901	2.04	0.10	34%	10,383	6,625	0.9	18.6	2.6	2.3	0.3	2.1%	0.5
2014E	10,898	3,679	2,431	2.61	0.10	34%	9,878	6,120	0.7	6.5	2.1	1.8	0.2	2.1%	0.5

Source: Renaissance Capital estimates

Figure 192: Price performance – 52 weeks

Source: Bloomberg

Figure 193: Karuturi EPS forecast



Source: Bloomberg

Investment summary

Karuturi's agricultural operations tend to be the focus of investors' attention. However it is the floricultural business that we believe is undervalued. With a lengthy history, Karuturi's floriculture operations have become a reliable source of cashflows and are stable. Therefore, the floriculture assets effectively set the floor for the share price.

The flagship floriculture business is reasonably separated from all the execution risks associated with agriculture. Karuturi possesses an integrated production model with in-house plantations, cultivation and distribution capabilities. The company's operations across India, Kenya and Ethiopia produce over 600mn rose stems annually spread over an area close to 300 ha.

The global floriculture industry is a $40bn business and with developing countries such as Russia seeing significant growth, demand is likely to grow steadily. A key supply-side advantage that Karuturi enjoys is its presence in Kenya and Ethiopia – both of which have recently emerged as production centres with comparative advantages in land and labour costs.

The story is agriculture not so straightforward. For sure, the African macro story remains compelling. As we explained in the first half of this report, we expect to see Africa undergo an agricultural revolution. The supply-side factors such as fertile arable land, favourable climatic conditions and low operating costs are bolstered by demand-side factors such as an urbanising population and a growing middle class across Africa and the world.

Moreover, Karuturi's hub, Ethiopia, offers other benefits in the form of supportive government policies and favourable access to certain lucrative markets. Low-cost financing, five-year tax holidays and import duty exemption for machinery and inputs are a few of the incentives offered by the government. Ethiopian exports into the EU enjoy reduced or nil duty, and are also free of quota restrictions. Finally, Ethiopian membership of the Common Market for Eastern and Southern Africa (COMESA) provides a ready market for agricultural commodities.

While these are operational advantages, there are also a couple of risk mitigation factors. Ethiopia has ratified the convention establishing the Multilateral Investment Guarantee Agency (MIGA) of the World Bank Group and Karuturi's application for MIGA insurance for its project is under process. Furthermore, Indian and Ethiopia have a Bilateral Investment Promotion and Protection Agreement.

But the above is only one side of the story. Pioneers of industrial-scale farming in Africa also face substantial execution risks. Generating regular returns from an agricultural business is a difficult proposition. As the earlier section *The inevitability of superfarms* points out, managing vast landholdings, even with external agricultural consultants, is not easy. Lessons learned in floriculture do not necessarily transfer directly to cereals and resource nationalism is an ever-present threat in an urbanising society with many smallholders. For sure, Karuturi will face numerous challenges, ranging from infrastructure needs, labour shortages, management capabilities, adverse weather events and so on.

Look at the recent flash floods which affected Karuturi in Ethiopia. In the first half of the financial year 2012, Karuturi was expected to harvest around 12,000 ha of corn in its Gambella. However, the entire crop was lost due to flash floods as the Baro River in breached its protective dykes. In response, the company has slowed down

its planting schedule for the rest of the year and will instead focus on rebuilding the dykes. Karuturi will also recognise INR368mn ($7.2mn) of costs associated with the lost harvest this year and additional capital expenditure incurred for rebuilding the dykes.

This episode highlights the risks associated with agriculture. Uncertainty is a fact of life for every farmer but one which some investors often overlook or have trouble rationalising. While losing a harvest of 12,000 ha is undoubtedly bad, we would argue that Karuturi has learned an important lesson at a relatively reasonable cost – flash floods at subsequent harvests may well have damaged a much higher acreage.

In summary, we think Karuturi's agricultural operations offer a unique opportunity. Undoubtedly risks remain but we believe Karuturi's track record in floriculture and its willingness to take ambitious risks will stand the company in good stead.

Given the varying risks associated with Karuturi's agricultural and floricultural businesses, we have valued the different businesses separately. Our valuation of the floricultural businesses separately implies a fair value of INR8.58 per share, 83% above the current market price. Given the stable nature of the floricultural business and Karuturi's track record, we believe, this should represent a minimum for Karuturi's share price. Karuturi's agricultural business, however risky, does not justify a negative valuation. Even with higher discount rates than what we assumed in May 2011 at the time of our initiation, Karuturi's fair value comes to INR10.58/share, implying an upside of 125% above the current price.

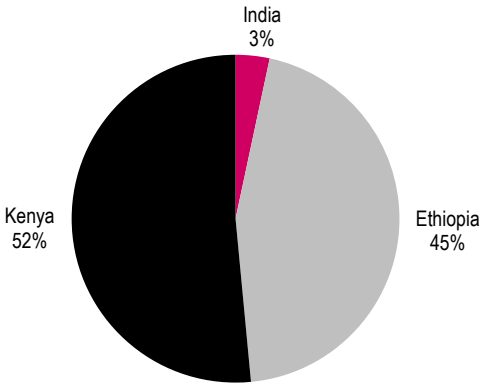
On our valuation, Karuturi trades at a 2012E EV/EBITDA of 4.2x – a 13% discount to the global agriculture peers average of 4.8x. We believe this discount is justified given Karuturi's lack of experience in the agricultural business.

Operational update

Karuturi's strategy in recent quarters has been to focus on its new agriculture operations and get 100,000 ha in Gambella under production within the next two years. In floriculture, the company has expanded its Ethiopian operations and has further scope to expand production over the next few years.

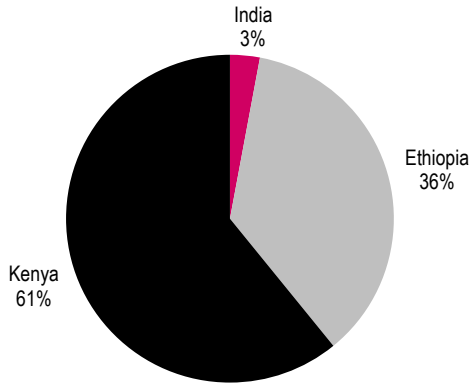
Karuturi's area under cultivation in Holeta, Ethiopia is around 60 ha and in Wolisso, Ethiopia about 75 ha. However, the potential area that could be cultivated in Wolisso is 200 ha, and Karuturi aims to reach that level over the next few years. Given Karuturi's focus in agriculture and to be conservative in our forecasts, we have assumed that there is no expansion in Wolisso beyond 100 ha that we expect Karuturi to reach by FY13. In Kenya, there are no plans to expand beyond the current 154 ha under production.

Figure 194: Split of area under floriculture, 2011



Source: Company data

Figure 195: Split of flower production, 2011



Source: Company data

In agriculture, Karuturi controls 311,000 ha of land on lease in the Bako and Gambella regions of Ethiopia. The company intends to cultivate short-, medium- and long-gestation crops. In the first phase Karuturi aims to cultivate cereal crops – rice and maize – on 65,000 ha and oil palm on 20,000 ha. The company recently announced plans to cultivate cotton and sugar too. Karuturi's plan is to employ modern agricultural practices and mechanisation to achieve yields higher than the Ethiopian averages.

As previously mentioned, Karuturi planted 12,000 ha of corn in Gambella early this year, which was lost due to flash floods. This resulted in a loss of around INR368mn ($7.2mn). It is to be noted that Karuturi had built dikes for 75-80km to protect its farms against floods. However, the overflow that occurred was above average and Karuturi's dikes were breached.

To prevent a recurrence of this situation, Karuturi has engaged WAPCOS (Water and Power Consultancy Services), an Indian water resources consultancy, and WaterWatch, a Dutch advisory firm. The company plans to completely overhaul its irrigation, drainage and flood control systems. Karuturi is now in the process of reconstructing the damaged dikes and making them taller. This would mean a slowdown in the company planting schedule. Instead of the 20,000 ha planed for the second crop this year, the company would now plant between 5 and 10,000 ha.

While the company expects to have around 65,000 ha under corn and rice in Gambella within two years, we take a more conservative view – we forecast the

company reaching 55,000 ha under cereals in Gambella in five years. We believe such an approach is wise as translating plans into action is particularly difficult in agriculture. One only has to look at the recent flooding episode to see the challenges involved. Once Karuturi manages to complete a couple of harvests, we would feel confident enough to follow the management's projections. In our forecasts, we have not considered revenues from sugar and cotton as those plans are still in the early stages.

In fact, the management itself has started becoming more circumspect in its estimates – for instance, while the initial plan was to cover the entire 65,000 ha in Gambella by Oct-Nov 2012, the company now plans to cultivate only about 20-25,000 ha by Oct-Nov 2012. Karuturi says that it first wants to ensure that its lands are adequately protected from floods, before expanding.

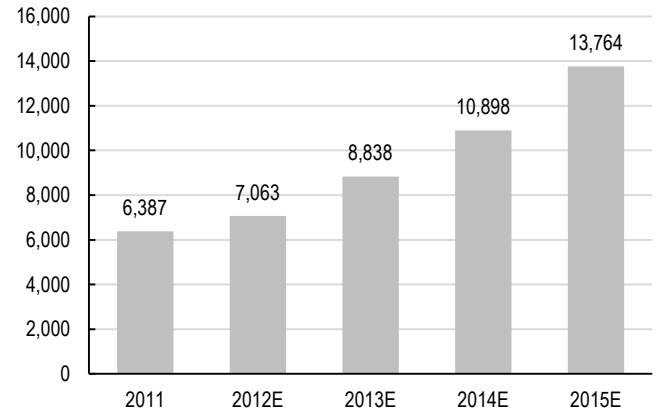
To ensure it has a ready market to sell its output, Karuturi is trying enter into off-take agreements with some African countries. The company has already signed a Memorandum of Understanding with the Republic of Djibouti for annual supplies of 40,000 tonnes at international prices.

A notable development is Karuturi's establishment of partnerships with local farmers to jointly develop land. The plan is that Karuturi provides the land and necessary infrastructure, while entrepreneurs grow crops of their choice. Revenues will be shared and Karuturi will receive 35-40%. This is an alternative operational model that reduces Karuturi's involvement in direct production. As we have said elsewhere in this report, investors in African agriculture will likely employ varied operational models in an attempt to find the one most suitable to their risk-reward expectations. In that context, Karuturi's partnership model is to be closely watched.

While these are medium-term developments, in the long-term Karuturi plans to replicate its Ethiopia model in other countries such as Tanzania, Mozambique, Senegal and Sierra Leone. The company has begun to look at land opportunities in these countries.

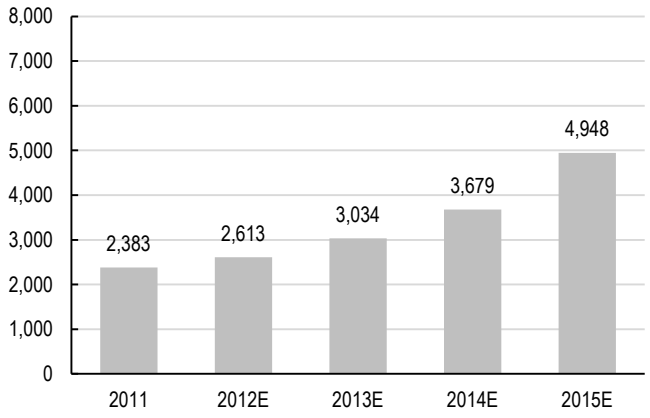
Forecasts

Figure 196: Revenue forecast, INRmn



Source: Renaissance Capital estimates

Figure 197: EBITDA forecast, INRmn



Source: Renaissance Capital estimates

Figure 198: African floriculture operations summary, $mn

Year-end 31-March	2011E	2012E	2013E	2014E	2015E
LAND UNDER PRODUCTION (ha)					
Holeta - Ethiopia	60	60	60	60	60
Wolisso - Ethiopia	75	75	100	100	100
Sher Karuturi - Kenya	154	154	154	154	154
Land under production (ha)	**289**	**289**	**314**	**314**	**314**
EFFECTIVE LAND UNDER PRODUCTION (ha)					
Holeta - Ethiopia	60	60	60	60	60
Wolisso - Ethiopia	63	75	88	100	100
Sher Karuturi - Kenya	148	154	154	154	154
Effective land under production (ha)	**270**	**289**	**302**	**314**	**314**
INSTALLED CAPACITY (millions of stems per ha)					
Holeta - Ethiopia	1.8	1.8	1.8	1.8	1.8
Wolisso - Ethiopia	1.8	1.8	1.8	1.8	1.8
Sher Karuturi - Kenya	2.5	2.5	2.5	2.5	2.5
PRODUCTION (millions of stems)					
Holeta - Ethiopia	108	108	108	108	108
Wolisso - Ethiopia	113	135	158	180	180
Sher Karuturi - Kenya	370	385	385	385	385
Total production (millions of stems)	**590**	**628**	**651**	**673**	**673**
EXPORTS (millions of stems)					
Ethiopia	216	238	260	282	282
Kenya	370	385	385	385	385
AVERAGE PRICE ($ per stem)					
Ethiopia - exports	0.31	0.31	0.31	0.31	0.31
Ethiopia - domestic	0.06	0.06	0.06	0.06	0.06
Kenya - exports	0.16	0.16	0.16	0.16	0.16
REVENUE ($mn)					
Ethiopia - exports	67	74	81	87	87
Ethiopia - domestic	0	0	0	0	0
Kenya - exports	59	62	62	62	62
Kenya - domestic	0	0	0	0	0
Total revenue	**126**	**136**	**143**	**149**	**149**

Source: Renaissance Capital estimates

Figure 199: African agriculture operations summary, $mn

Year-end 31-March	2011E	2012E	2013E	2014E	2015E
LAND UNDER CULTIVATION ('000s of ha)					
Bako	0	1	5	10	10
Gambella	0	9	25	40	70
Land under cultivation ('000s of ha)	**0**	**10**	**30**	**50**	**80**
PLANTED AREA ('000 of ha)					
Rice	0	0	3	15	15
Corn	0	9	47	65	105
Palm		1	5	10	20
Total planted area	**0**	**10**	**55**	**90**	**140**
Effective planted area	**0**	**10**	**30**	**50**	**80**
YIELD (t/ha)					
Rice		nm	3.5	3.7	3.7
Corn		3.5	3.5	3.7	3.7
Palm (Fresh Fruit Bunches - FFB)				2.5	7.5
GROSS HARVEST ('000 of tonnes)					
Rice	0	0	11	56	56
Corn	0	30	165	241	389
Palm (Fresh Fruit Bunches - FFB)	0	0	0	25	150
Rice recovery by milling (%)		100%	100%	100%	100%
Crude palm oil (CPO) extraction rate (%)				20%	20%
Palm kernel yield (%)				4%	4%
SALES ('000 of tonnes)					
Rice	0	0	11	56	56
Corn	0	26	151	221	389
Palm - CPO	0	0	0	5	30
Palm kernel	0	0	0	1	6
AVERAGE PRICE ($ per tonne)					
Rice	400	400	400	400	400
Corn	225	225	225	225	225
Palm - CPO	990	1,000	1,000	1,000	1,000
Palm kernel	200	200	200	200	200
REVENUE ($mn)					
Rice	0	0	4	22	22
Corn	0	6	34	50	87
Palm - CPO	0	0	0	5	30
Palm kernel	0	0	0	0	1
Total revenue	**0**	**6**	**38**	**77**	**141**

Source: Renaissance Capital estimates

Valuation

We have used the SoTP method to value the company. For each segment, we have used what we regard as the appropriate WACC and terminal growth rate to calculate its value. Given the higher risk aversion in the global markets currently, we have increased the discount rate we use by 300-500bps compared to the ones we used in May 2011 during our initiation.

We have used a higher WACC for the African operations compared to the Indian operations. Further, since the floriculture operations in Africa are relatively well-established, we have used a lower WACC as compared to the African agricultural operations, which we believe would be the most risky for Karuturi. However, we also believe that the agricultural operations are likely to see high growth and hence have assumed a higher terminal growth rate.

Figure 200: Karuturi valuation, INRmn

SEGMENT	WACC	g	EV	CY12E EBITDA	Implied multiple
Cereals	25%	3%	1,108	286	3.9
Palm	25%	3%	241	-35	nm
Ethiopian floriculture	21%	1%	5,990	1,569	3.8
Kenyan floriculture	21%	1%	3,766	905	4.2
Indian floriculture	19%	1%	886	164	5.4
Others	19%	1%	179	39	4.6
Enterprise value			**12,170**	**2,929**	**4.2**
Plus cash			2,302		
Plus investments			28		
Less debt			6,409		
Less minority interest			0		
Equity value			**8,090**		
No. of shares - diluted (mn)			930		
Adjustment factor (to get value to 31-Mar-2012)			1.22		
Value per share (INR)			**10.58**		
Floriculture operations only					
Enterprise value - floriculture			10,642		
Net debt, investments and minorities			(4,080)		
Equity value - floriculture			6,562		
Adjustment factor (to get value to 31-Mar-2012)			1.22		
Value per share - floriculture (INR)			**8.58**		

Source: Renaissance estimates

The chart above shows our segmental valuation. We have also calculated the EV/EBITDA multiple that is implied by our valuation for each segment. Karuturi's EV comes to INR12,170mn or about $240mn, and its fair value comes to INR10.58/share.

On our forecasts, the floriculture operations alone should have a fair value of INR8.58/share. We believe, this should be the floor for Karuturi's share price, as the floriculture business is a relatively stable business where Karuturi's has proven its competence. Karuturi's agricultural business, for all the associated risks, is certainly not value erosive, in our view.

On relative terms, our EV of INR12,170mn implies a 2012E EV/EBITDA multiple of 4.2x. This is at a 13% discount to its peers, which is justified by Karuturi's lack of proven execution capabilities in agriculture.

Figure 201: Karuturi peer valuation

	Country	MktCap. $mn	EV $mn	P/E 2011E	P/E 2012E	EV/EBITDA 2011E	EV/EBITDA 2012E
SLC Agricola	Brazil	947	1,133	14.6	15.3	7.1	7.2
Black Earth Farming	Russia	312	360	na	8.0	19.5	6.1
Agroton	Ukraine	132	151	6.2	5.2	4.2	3.5
Sintal	Ukraine	67	66	33.5	6.4	10.9	4.7
Landkom	Ukraine	23	22	na	7.9	2.9	2.3
Average				**18.1**	**8.5**	**8.9**	**4.8**

Source: Bloomberg, Renaissance Capital estimates

Financial statements

Figure 202: Karuturi Global summary financials, Mar YE

Income statement, INRmn	2011	2012E	2013E	2014E	2015E
Sales	6,387	7,063	8,838	10,898	13,764
Other income	65	47	76	74	87
Total revenue	**6,452**	**7,110**	**8,914**	**10,972**	**13,851**
Material costs	(2,129)	(2,223)	(3,436)	(4,675)	(6,116)
Employee expenses	(424)	(447)	(468)	(484)	(484)
Selling & administrative expenses	(1,451)	(1,780)	(1,900)	(2,060)	(2,216)
Miscellaneous expenses	0	0	0	0	0
Financial charges	(266)	(258)	(321)	(321)	(321)
Depreciation and amortisation	(619)	(723)	(848)	(951)	(1,031)
Profit/(loss) before tax	**1,564**	**1,679**	**1,940**	**2,480**	**3,683**
Exceptional items	0	(368)	0	0	0
Income tax	(14)	(26)	(39)	(50)	(221)
Net profit/(loss) for period	**1,550**	**1,285**	**1,901**	**2,431**	**3,462**
EBITDA - RC definition	**2,383**	**2,613**	**3,034**	**3,679**	**4,948**
EBIT - RC definition	**1,765**	**1,891**	**2,186**	**2,728**	**3,917**

Cashflow statement, INRmn	2011	2012E	2013E	2014E	2015E
Net profit	1,550	1,285	1,901	2,431	3,462
Miscellaneous expenses	0	0	0	0	0
Depreciation and amortization	619	723	848	951	1,031
Financial charges	266	258	321	321	321
Cashflow before change in w.cap	**2,434**	**2,266**	**3,071**	**3,703**	**4,814**
Decrease / (increase) in inventories	(204)	(63)	(77)	(63)	(49)
Decrease / (increase) in sundry debtors	(76)	(134)	(352)	(409)	(569)
Increase / (decrease) in sundry creditors	(28)	138	168	137	106
Increase / (decrease) in provisions	43	0	0	0	0
Increase in other assets	(809)	0	0	0	0
Increase in other liabilities	131	0	0	0	0
Cashflow from operations	**1,492**	**2,206**	**2,810**	**3,369**	**4,303**
Purchase/(sale) of fixed assets	(3,556)	(3,994)	(2,467)	(2,313)	(1,255)
Investments	(15)	0	0	0	0
Goodwill	(371)	0	0	0	0
Cashflow from investing	**(3,941)**	**(3,994)**	**(2,467)**	**(2,313)**	**(1,255)**
Proceeds from issue of shares	316	0	0	0	0
Proceeds from issue of warrants	(760)	0	0	0	0
Increase/(decrease) in loans	1,188	3,600	0	0	0
Others	3,692	0	0	0	0
Financial charges	(266)	(258)	(321)	(321)	(321)
Dividends paid	(52)	(81)	(81)	(81)	(81)
Dividend distribution tax paid	0	(13)	(13)	(13)	(13)
Cashflow from financing	**4,118**	**3,248**	**(415)**	**(415)**	**(415)**
Net change in cash	**1,670**	**1,461**	**(72)**	**642**	**2,633**
Cash at beginning of period	632	2,302	3,762	3,690	4,332
Cash at end of period	**2,302**	**3,762**	**3,690**	**4,332**	**6,965**

Per share data	2011	2012E	2013E	2014E	2015E
Number of shares - basic	806	806	806	806	806
Number of shares - diluted	889	930	930	930	930
EPS - basic	2.70	1.59	2.36	3.02	4.30
EPS - diluted	2.36	1.41	2.04	2.61	3.72
DPS	0.10	0.10	0.10	0.10	0.10
BVPS - diluted	20.12	15.81	17.41	19.92	23.54
FCFF - diluted	(2.21)	(2.09)	0.46	1.30	3.53

Growth rates, %	2011	2012E	2013E	2014E	2015E
Sales	20%	11%	25%	23%	26%
EBITDA	24%	10%	16%	21%	35%
EBIT	29%	7%	16%	25%	44%
Net Income	8%	-17%	48%	28%	42%

Balance sheet, INRmn	2011	2012E	2013E	2014E	2015E
Goodwill on consolidation	1,127	1,127	1,127	1,127	1,127
Fixed assets	12,111	15,382	17,001	18,362	18,586
Capital work in progress	1,565	1,565	1,565	1,565	1,565
Investments	28	28	28	28	28
Deferred tax assets	2	2	2	2	2
Forex translation difference	67	67	67	67	67
Non-current assets	**14,901**	**18,172**	**19,790**	**21,152**	**21,376**
Inventories	377	441	517	580	628
Sundry debtors	1,267	1,401	1,753	2,162	2,731
Cash and bank balances	2,302	3,762	3,690	4,332	6,965
Other current assets	0	0	0	0	0
Loans and advances	1,153	1,153	1,153	1,153	1,153
Current assets	**5,100**	**6,758**	**7,115**	**8,228**	**11,478**
Miscellaneous expenditure	0	0	0	0	0
Total assets	**20,000**	**24,930**	**26,905**	**29,379**	**32,854**
Share capital	806	806	806	806	806
Share warrants	0	0	0	0	0
Reserves and surplus	12,386	13,577	15,385	17,722	21,091
Total equity	**13,192**	**14,383**	**16,191**	**18,528**	**21,896**
Loans	5,585	9,185	9,185	9,185	9,185
Deferred tax liabilities	0	0	0	0	0
Non-current liabilities	**5,585**	**9,185**	**9,185**	**9,185**	**9,185**
Sundry creditors	824	962	1,130	1,267	1,373
Provisions	124	124	124	124	124
Other current liabilities	275	275	275	275	275
Current liabilities	**1,223**	**1,362**	**1,529**	**1,666**	**1,772**
Total liabilities	**6,809**	**10,547**	**10,714**	**10,852**	**10,957**
Total equities and liabilities	**20,000**	**24,930**	**26,905**	**29,379**	**32,854**

Performance ratios, %	2011	2012E	2013E	2014E	2015E
EBITDA margin	37%	37%	34%	34%	36%
EBIT margin	28%	27%	25%	25%	28%
Net Income margin	24%	18%	22%	22%	25%
RoAA	10%	8%	8%	10%	13%
RoAE	14%	9%	12%	14%	17%
RoIC	12%	10%	10%	11%	15%
RoIC/WACC	0.5	0.5	0.5	0.5	0.7

Balance sheet ratios, %	2011	2012E	2013E	2014E	2015E
Debt / equity	49%	71%	64%	56%	48%
Debt / capital	33%	41%	39%	36%	33%
Net debt / equity	31%	44%	41%	33%	16%
Net debt / EBITDA	172%	244%	218%	166%	73%

Valuation ratios	2011	2012E	2013E	2014E	2015E
P / E (x) - basic	1.7	2.9	2.0	1.6	1.1
P / E (x) - diluted	2.0	3.3	2.3	1.8	1.3
P / FCFF (x) - diluted	nm	nm	10.3	3.6	1.3
P / B (x) - diluted	0.2	0.3	0.3	0.2	0.2
EV / sales (x)	1.2	1.1	0.9	0.7	0.6
EV / EBITDA (x)	3.3	3.0	2.6	2.1	1.6
EV / FCFF (x)	nm	nm	18.6	6.5	2.4
Dividend yield (%)	2.1%	2.1%	2.1%	2.1%	2.1%

Source: Company data, Renaissance Capital estimates

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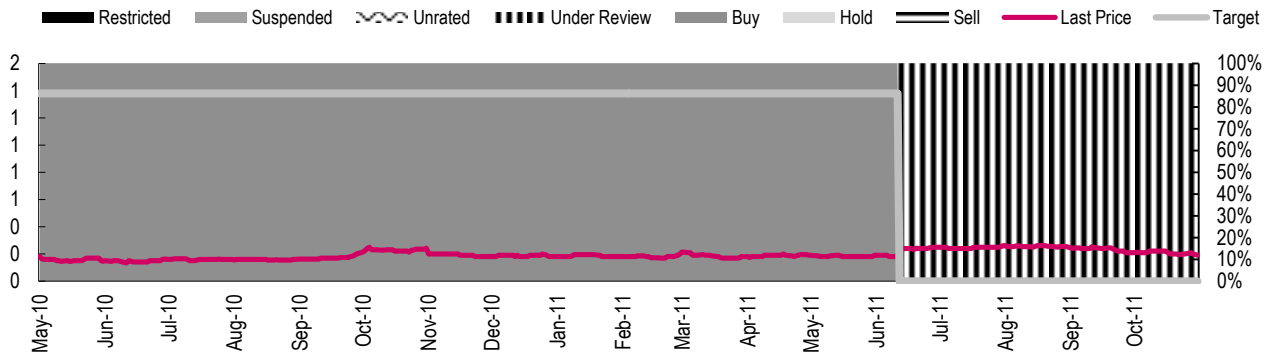
Renaissance Capital equity research distribution ratings

Investment Rating Distribution Renaissance Capital Research		
Buy	135	56%
Hold	71	29%
Sell	17	7%
Under Review	19	8%
Suspended	0	0%
Restricted	0	0%
	242	

Investment Banking Relationships* Renaissance Capital Research		
Buy	2	67%
Hold	1	33%
Sell	0	0%
Under Review	0	0%
Suspended	0	0%
Restricted	0	0%
	3	

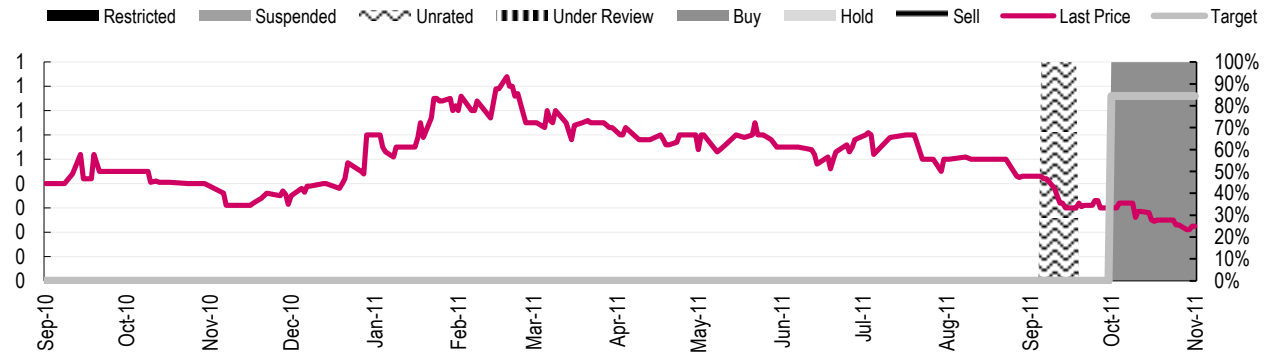
*Companies from which RenCap has received compensation within the past 12 months.
NR – Not Rated
UR – Under Review

AICO share price, target price and rating history



Source: Renaissance Capital, prices local market close or the mid price if illiquid market

Feronia share price, target price and rating history



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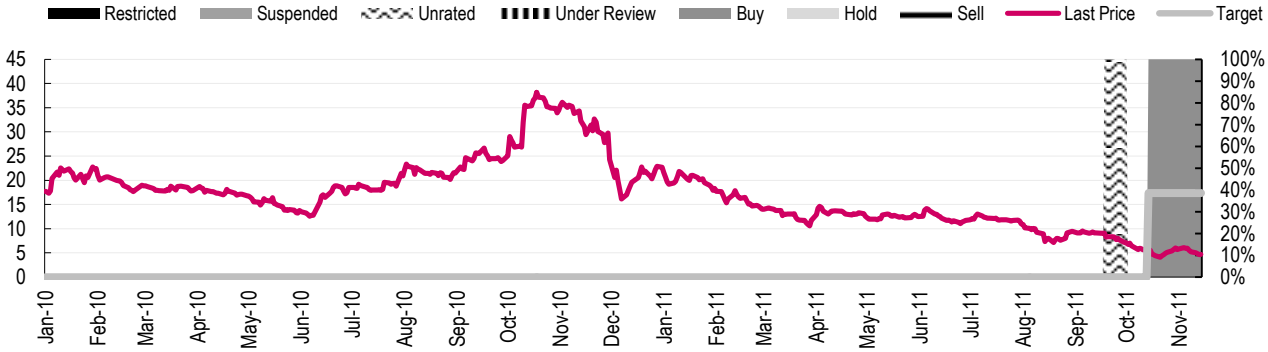
Karuturi share price, target price and rating history



Source: Renaissance Capital, prices local market close or the mid price if illiquid market

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