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No. 1921| Mai 2014

Web: www.ifw-kiel.de

Kiel Working Paper No.1921 | Mai 2014

Rural Welfare Implications of Large-scale Land Acquisitions in Africa: A Theoretical Framework*

Linda Kleemann, Rainer Thiele

Abstract

Large-scale agricultural land acquisitions might entail substantial welfare implications for the affected rural population. Whether the impacts are indeed as devastating as the popular notion of "land grabs" would suggest depends on a number of factors, including the size of compensation payments, productivity spillovers on smallholders, employment opportunities for displaced farmers, and changes in food prices. We study the local welfare effects of land acquisitions in Sub-Saharan Africa using a theoretical model that captures the major channels through which land deals might affect rural African populations. We distinguish two basic scenarios. In the first scenario, the investor plants capital intensive staple food crops. Displaced farmers compete for a very limited number of jobs on the investment farm and spillovers to the remaining local farmers are rare. In the second scenario, where the investor is assumed to plant cash crops, potential spillovers through contract farming are larger and production is more labor intensive and hence provides better employment prospects. In both scenarios the crop produced on the investment farm is exported. The net welfare outcome varies with the relative strengths of the contradicting effects of spillovers, wages and food prices. We determine the minimum size of compensation payments for displaced farmers that would leave them as well off as staying on their plot.

Keywords: large-scale land acquisitions, local populations, welfare effects, displacement, food prices

JEL codes: O13 ; Q12

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* We thank Marjan Aikimbaeva and Finn-Ole Semrau for valuable help with the model.

1. Introduction

The transfer of large areas of agricultural land in the developing world to international investors from Europe, the US, Asia and the Arab region has become one of the most hotly debated current development issues (Schoneveld 2014). NGOs and parts of the media refer to these large-scale land acquisitions as "land grabs" or a "new global land rush" with a strongly negative connotation. In contrast, the governments of many of the target countries regard them as development opportunities. According to the Land Matrix database of large-scale agricultural land acquisitions, more than 30 million hectares of land were acquired by foreign investors under long-term lease contracts between 2000 and 2012 (Land Matrix 2013), with Africa being the most targeted region. Investors tend to compete for land with local farming communities rather than focusing on idle land (Anseeuw et al. 2012). This might entail substantial welfare implications for the affected rural populations. Whether the impacts are indeed as devastating as the notion of "land grabs" would suggest depends on a number of factors, including the size of compensation payments, productivity spillovers on local small-scale farmers, and employment opportunities for displaced farmers. Since many land investment projects have not yet reached the production stage, only little empirical evidence is available on the quantitative importance of these factors.

Based on the mostly anecdotal evidence that does exist, this paper analyzes possible scenarios for the local welfare effects of land acquisitions in Sub-Saharan Africa using a theoretical model that captures the major channels through which land deals might affect rural African populations. Our point of departure is an occupational choice model by Dessy et al. (2012), who assume that smallholders affected by large-scale land acquisitions can either stay in the farming community and share the remaining land or switch to wage employment on the investment farm, choosing the option that offers the higher pay-off. We follow Dessy et al. (2012) in distinguishing farming and wage employment as alternative occupations, but consider it more plausible to assume that displaced farmers are forced to seek wage employment on the investment farm even if they have to accept income losses. This is because new employment opportunities on investment farms are limited, generally low-paid and often seasonal. Another distinctive feature of our approach is that possible spillovers such as knowledge transfers from the investors to the smallholders who stay on their plots are explicitly taken into account. Finally, we consider two archetypical investment scenarios, one for staple food crops and one for cash crops. These scenarios can be expected to lead to different welfare implications, amongst others because of different labor intensities of production.

The remainder of the paper is organized as follows. In Section 2, we present selected stylized facts that provide a basis for modelling the welfare effects of land investments. The model's setup is introduced in

Section 3, while Section 4 uses the model to investigate how large-scale land acquisitions might affect the welfare of the local farming population. Section 5 discusses several of the assumptions underlying the modelling framework. Section 6 concludes.

2. Stylized facts

The welfare implications of large-scale land acquisitions for the local population crucially depend on the conditions under which the land transaction itself is conducted. Case study evidence suggests that the land governance systems of Sub-Saharan African countries, comprising a multitude of sometimes contradictory laws derived from colonial and customary systems, tend to privilege powerful actors such as the investor, the host government and local chiefs while giving little or no voice to local land users (e.g. Nolte 2014; Nolte and Väth 2013). The land deals are typically negotiated by the government or local community leaders on behalf of the affected population, which may give rise to rent-seeking coalitions between investors and domestic negotiators, possibly leading to displacement of farmers without compensation.

Not surprisingly given the sensitivity of the issue, evidence on displacements is scarce. The Land Matrix includes only 40 cases (out of 1217 reported land deals, of which 625 come from reliable data sources) where information on displacement is available. In all other cases displacements may or may not have occurred, rendering it impossible to assess their frequency. The fact that investors often compete with local farmers for the same areas of land (Anseeuw et al. 2012) suggests, however, that displacements are fairly widespread. 25 of the 40 known cases are reported to have led to the displacement of at least 1000 people, and ten of these to the displacement of more than 10000 people (Table 1). These numbers point to a sizeable dimension of the problem, even though it is hard to gauge how representative the small sample of 40 cases is. From our own literature research of almost 300 case studies from Sub-Saharan Africa, we find that 46 explicitly report displacements with the associated investments covering various food and fuel crops (see Table 2); many more are imprecise about them.[1]

Displaced farmers in Sub-Saharan Africa are unlikely to be adequately compensated for the loss of their land. Schoneveld et al. (2011), for example, show for the case of biofuel feedstock plantations in Ghana that compensation amounted to only 12.6 percent of lost land. Insufficient compensation payments are also mentioned in many of the cases covered in our own literature research. This is partly because lease fees or other payments that governments obtain from the investors are typically very low. For the 53 cases

[1] A complete table including all cases studies covered in the literature research is available from the authors upon request.

in the Land matrix with details on compensation schemes, average annual payments amount to US$ 12 per hectare as compared to much more than US$ 100 in the US or the EU (Anseeuw 2012: 42). Even if consulted, the affected smallholders usually lack information and negotiating power. Arezki et al. (2011) provide evidence that investors are disproportionately engaged in Sub-Saharan African countries where land governance systems are deficient, land rights of local populations are only weakly protected and smallholders are hence in an inferior bargaining position. In addition, proceeds may be diverted by the government or the local authorities when they receive the compensation on behalf of the affected communities. This happens for instance when the local chiefs or the local government play a powerful unmonitored role in the negotiations, which gives them the opportunity to gain personal advantages (Brown 2005: 98–100). Even if they reach the displaced farmers, compensation payments are often insecure and meant to compensate only for belongings on the farm and not for the land itself (e.g. Deng et al 2010: 27). In our basic model specification below we therefore neglect compensation payments, which is consistent with two alternative scenarios: (i) there are no compensation payments to displaced farmers, but also no immediate losses to farmers except land and there is no transition period; (ii) the compensation payments only account for losses of personal belongings and for a possible transition period in which displaced farmers do not yet earn wage income. In this case, they can be neglected in our model, which neither takes into account personal belongings except land nor the transition period.

How the displaced farmers' welfare is affected depends not only on compensation but also on whether they can find new jobs and how well these are paid. Labour requirements on investment farms vary depending on the crop. Case studies of selected land acquisitions show that tree crops such as rubber and oil palm generate 10 to 30 times more jobs per hectare than large-scale mechanized grain farming (Deininger et al. 2011). Flowers and tea are other examples of labor intensive agricultural commodities grown on investment farms (Heumesser and Schmid 2012). Accordingly, our welfare analysis below distinguishes labor intensive cash crop production and capital intensive staple food crop production. In addition, we make the simplifying assumption that displaced farmers are only employed by the investor. This neglects indirect labor demand through backward linkages (e.g. purchase of fertilizer) and forward linkages (e.g. local processing of crops), for which there is however very limited empirical support (e.g. de Schutter 2011). In addition, there is some evidence of displaced farmers migrating to other rural areas or urban centers because they fail to find work on investment farms (e.g. Tsikata and Yaro 2011; Locher 2011; Schoneveld et al. 2011), which we also neglect in our model.[2]

[2] We are however aware that particularly this latter point has potentially far reaching relevance for regional development. In this case, net welfare implications depend, amongst others, on employment opportunities in urban centers which we cannot account for in our model.

Case study evidence points towards limited, often seasonal and generally low-paid employment opportunities on investment farms. Benjaminsen et al. (2011) report that in Tanzania wages on investment farms tend to be below the national minimum wage. Based on an analysis of investment projects in Mali and Ruanda, respectively, Diallo et al. (2009) as well as Veldman and Lankhorst (2011) conclude that wages of displaced workers do not suffice to compensate for the loss of previous income generation opportunities. This is not to deny that large farms also offer some skilled and better-paid employment, especially at the management level (Heumesser and Schmid 2012), but this is mostly imported. Chinese investors in particular have been accused of bringing their own workers with them. Yet, investors claim that highly qualified labour is not sufficiently available in investment regions forcing them to employ qualified labourers from outside the region. Evidence from Ghana and Ruanda corroborates this pattern (Tsikata and Yaro 2011; Veldman and Lankhorst 2011).

Unlike the displaced smallholders, the farmers who retain their land do not experience direct and immediate changes in their welfare, but over time, large agricultural projects are expected to contribute to more productive local farming through spillover effects provided e.g. by improved infrastructure. Positive infrastructure spillovers would include better access to modern seeds, fertilizer and machinery. Since the technology used on highly mechanized farms differs considerably from the needs of small-scale farms existing in the area, it appears reasonable to assume that the extent of these spillovers also rises with labour intensity. The limited evidence so far does not point to clear improvements in farming infrastructure associated with land investments. In focus group discussions with affected farmers in Kenya, Mali and Zambia, for example, few people said they had adopted the investor's farming techniques or benefited from technology the investor provided (e.g. Nolte 2014). Rather, the general perception was that investors "fence off their land". Others mentioned negative spillovers, particularly the use of chemical fertilizers, deforestation and the diversion of water. Our own literature research also provides a mixed picture: of the 25 cases for which (potential) impacts on farming infrastructure can be identified, 19 report positive spillovers and 10 negative spillovers (with 4 reporting both). On the positive side, knowledge transfers (e.g. farmer training) and community or general infrastructure investments (e.g. roads) are mentioned in 10 and 18 cases respectively.

Evidence on whether the presence of large investors actually raises the productivity of local smallholders is almost non-existent.[3] Adewumi's (2013) investigation of large-scale farms in Nigeria owned by white Zimbabweans constitutes an exception. His findings point to better performance of local farmers after

[3]This is mainly due to the fact that many investment projects have not yet started operating (see Land Matrix 2013).

adopting some of the white farmers' technology, with efficiency levels of more than 90 percent of the production frontier within the investment area as compared to less than 50 percent outside the area.

Potential productivity improvements are large given that the difference between possible output and what is attained at current technology, institutions and infrastructure – the so-called yield gap – is nowhere higher than in Sub-Saharan Africa (Deininger and Byerlee 2012). Productivity spillovers in the form of improved farming infrastructure or knowledge spillovers may help close this gap. Knowledge spillovers, which can come about through contract farming or farm workers who spread information about new farming techniques, are most likely to materialize when labour intensity is high. Even if large-scale farmers can produce crops at a lower cost than smallholders, some may still rely on contract farming in order to reduce labour supervision costs (Deininger and Byerlee 2012), or to diversify market risk (e.g. Suzuki et al., 2011).[4] Of the 271 reported case studies in Sub-Saharan Africa that we have covered in our literature research, 36 mention contract farming (Table 3). These schemes mostly involve the cultivation of cash crops and biofuels such as jatropha and only in two instances are related to staple food crops (rice and maize), which provides some support for the hypothesis that the frequency of contract farming rises with labour intensity.[5] To capture these differences in a stylized way, we define one cash crop scenario with spillovers and one staple food crop scenario without.

Local welfare may also be affected by changes in local food prices as a result of the land acquisition. One common fear is that large-scale crop production for biofuels may drive up food prices globally and locally. In our model, all investment farm production is exported and there are no feedback effects from international markets. Hence, local food prices depend entirely on changes in local food production by smallholders. This is consistent with two explanations: 1) exports from the investment farm are insignificantly small on the global market and hence do not influence global food prices no matter whether they enter as food or fuel products, and/or 2) global food price changes are only transmitted to a very limited extent to the affected rural area. Changes in local food prices are particularly relevant for displaced farmers who have to buy more food on the local market and therefore become more dependent on food prices when moving from farming to wage employment. But remaining farmers who produce their own food and participate in the local market as buyers and sellers of food (Barrett 2008) are also affected. They can be net sellers or net buyers of food, the latter being more likely in the context of small-scale Sub-Saharan African farmers, most notably among the poorer parts of the population (Ivanic and Martin 2008). Direct evidence on the food price effects of large-scale land acquisitions is not available. According to the land matrix report (Anseeuw et al. 2012), most investment projects are export oriented,

[4] The lower contract enforcement costs are, the likelier it is that substantial contract farming will take place. Swinnen (2009) names the main conditions under which successful contract farming occurs.

[5] In some cases, investors do not report which crops they (intend to) produce.

which would point to rising food prices due to reduced domestic supply. Yet there are counteracting effects that may dampen the price increase or even prevent food prices from rising. Sufficiently large positive spillovers may enable local smallholders to increase their production. In addition, localized price effects will not materialize if food markets in the investment area are well integrated into a larger domestic market, which is however unlikely to be the case in much of Sub-Saharan Africa (e.g. Aker and Mbiti 2010). As long as productivity spillovers play a minor role we can therefore assume that large-scale land investments are associated with rising local food prices.

3. Model setup

Our model is based on Dessy et al. (2012), but departs from their specification in two major ways.[6] First, we assume that displaced farmers are forced to work on the investment farm at a possibly very low wage, which is in contrast to Dessy et al. where they can freely choose between wage employment and farming on the remaining land. Second, the two models differ with respect to the factors that may give rise to a lower than optimal use of modern inputs by smallholders. While Dessy et al. argue that smallholders in Africa are often constrained by the social obligation to share surpluses resulting from modernization efforts with their kin, we focus on economic constraints such as imperfect input markets and limited knowledge about or access to modern technologies. If the foreign firm uses modern inputs and technologies, the economic constraints smallholders face may be alleviated through spillover effects.

Our model is flexible enough to accommodate a variety of alternative settings in which land investments can take place. We show for instance that compensation payments can readily be included in the current model structure. As another example, the investor may be of local or foreign origin, even though we call him "foreign"; the only assumption we make is that he is foreign to the particular local community.

We consider a rural community populated by a known number of ex-ante homogeneous agents, which we refer to as smallholders. Agriculture is the predominant source of income in this geographic area. The economy is endowed with a fixed stock of land, Z, which can be left idle or used by smallholders or commercial investors to produce crops. Land is owned by the state or the local community. The owner allocates a portion of the land, $Z_{s,}$ to smallholders for small-scale farming and leases the rest of it, Z_c, to a representative foreign firm (C), at a price p_c per unit of land leased. Hence, Z=Z_c+Z_s. We assume that there is at least partial competition between smallholders and the investor, i.e. the land given to the

[6] Dessy et al. (2012) is the only theoretical paper we are aware of that focuses on the welfare of the population directly affected by large-scale land acquisitions. Das (2012) develops a theoretical general equilibrium trade model to investigate how land acquisitions affect sectoral production structure and income distribution in host countries.

investor was not entirely idle before the acquisition. In accordance with our reasoning above we assume that the proceeds the government gets from leasing the land are either insignificantly low or distributed within government offices (corruption) so that none of it is allocated to the smallholders. The representative firm may pay a certain amount p_s to the local community, which can be used to finance the transition for displaced smallholders. The total cost of the land for the company then amounts to p_c+ p_s.

The farmland Z_s that remains for small-scale cultivation is not redistributed between the farmers who stay on their plot and those who are displaced, which implies that the latter are forced to leave farming. Hence, even though we distinguish two alternative sources of livelihood for the smallholder – small-scale farming and wage employment on the investment farm – the choice between the two options is not free. When the smallholder is not displaced, he farms. When he is displaced he automatically moves to wage employment given the availability of jobs. Further below we explain under which conditions the smallholder might give up his farm voluntarily.

Wage employment yields an income ω, which is used to purchase a substitute for the home-grown crop. The displaced farmer has to buy all his food – either locally produced or imported –on the local market. If c_m is the quantity of food purchased at the given market price p_m, he faces the following budget constraint:

$$p_m c_m \leq \omega \qquad [1]$$

If his income exceeds consumption needs, the displaced smallholder can accumulate wealth W_w:

$$W_w = \omega - p_m c_m \qquad [2]$$

The smallholder

The smallholder uses the amount of land z_f and a composite input e_f (for instance, seeds and fertilizer) to produce output y_f:

$$y_f = z_f^{\alpha} e_f^{\gamma} \text{ , where } \alpha + \gamma = 1 \text{ , with } \alpha, \gamma \in (0,1) \qquad [3]$$

Small-scale farming yields a net income of F, which is partly in kind (home-grown food for own consumption) and partly from crop sales on the local market. We assume that the amount of home consumption c_a is fixed. This implies that the percentage of crop output sold on the market increases with productivity. Valuing the farmer's whole output at market prices and taking into account production costs, with p_e being the price of input e, total farm income is:

$$F = z_f^{\alpha} e_f^{\gamma} p_m - p_e e_f \qquad [4]$$

After consuming a share of his produce c_a and buying inputs e_f at price p_e, the smallholder may have a fraction $(z_f^\alpha e_f^\gamma - c_a - p_e e_f)$ left for selling it in the local market. In the absence of other income sources, this defines his budget constraint:

$$p_m y_m \leq (z_f^\alpha e_f^\gamma - c_a - p_e e_f)p_m \quad [5]$$

where $p_m y_m$ denotes the farmer's food expenditures on the market.

It has to be noted, however, that many Sub-Saharan African farmers are net food buyers. In this case, $(z_f^\alpha e_f^\gamma - c_a - p_e e_f)p_m < p_m y_m$. We assume that net-food-buying farmers receive additional income from a non-farm job in order to survive. We call this income remittances RM, given that remittances to rural areas are very common in Sub-Saharan Africa, but for our model it only matters that the additional income is exogenously fixed and does not change over time. When net food sales or remittances exceed farmers' food needs they are able to accumulate wealth W_f, which is simply the income left over. The budget constraint of the farmer then is:

$$p_m y_m \leq (z_f^\alpha e_f^\gamma - c_a - p_e e_f)p_m + RM \quad [6]$$

With:

$$W_f = (z_f^\alpha e_f^\gamma - c_a - p_e e_f)p_m + RM - p_m y_m \quad [7]$$

Spillovers and Optimal Use of Modern Inputs

Following Dessy et al. (2012), all local farmers are assumed to have an approximately equal plot of farmland. If n $\in (0, 1)$ denotes the total number of farmers in the area, they face a land use constraint of *zn* = *Z*, and the per capita farm size among local farmers is:

$$z_f = \frac{Z - Z_C}{n} \quad [8]$$

Replacing z_f in the production function yields:

$$y_f = (\frac{Z - Z_C}{n})^\alpha e_f^\gamma \quad [9]$$

Since land is divided equally among the farmers in the area, the average output of the community is:

$$\bar{y}_f = (\frac{Z - Z_C}{n})^\alpha \bar{e}_f^\gamma \quad [10]$$

where $\bar{e} \geq 0$ is the average input level. In equilibrium, $\bar{e} = e$ holds for each farmer. We assume that $\bar{e}$ is sub-optimal, whereas the level of input use e_c, of the investment farm is higher, i.e. $e_c > \bar{e}$, and possibly, but not necessarily, reaches the optimum. The investment farm can improve conditions for local farmers in two ways:

1. Improvements in farming infrastructure, e.g. better access to seeds and fertilizer
2. Knowledge transfer via farm workers or contract farming.

We consider only these types of spillovers, neglecting those from investment in improved general transport and energy infrastructure, for example electricity grids being built. This is because the latter are indirect – not directly related to the investment farm activities – and uncertain (Tsikata and Yaro 2011). In addition, they may only materialize in the longer term.

The spillovers lower the price local farmers have to pay for inputs in the following way:

$$p_e = \rho - \lambda(p_c + p_s)Z_C \qquad [11]$$

where $\rho > 0$ is the per unit cost level and $\lambda \geq 0$ is a scale operator indicating the amount of spillovers generated by the investment farm. The term $(p_c + p_s)Z_C$ denotes the reduction of farming modernization costs R. We assume that the greater the price paid for the land $(p_c + p_s)$ and the greater the land area Z_C, the greater the investment in its development, thereby also in farming infrastructure. The higher λ the more falls $p_{e,}$ and the larger is the rise in input use $\bar{e}$. When the use of inputs is suboptimal, an increase in $\bar{e}$ will raise productivity.

To ensure that prices are always non-negative, we assume that

$$\rho - \lambda(p_c + p_s)Z \geq 0 \qquad [12]$$

Farming equilibrium

The remaining (non-displaced) farmers choose their input level so as to maximize farm income F at given food and input prices, i.e., $\max_e F\,(p_m, p_e)$. The derivative is:

$$\partial F/_{\partial e} = (\tfrac{Z-Z_C}{n})^{\alpha} e_f^{\gamma-1} p_m\, \gamma - p_e = 0 \qquad [13]$$

$$\text{with } e = \left[\frac{p_m}{p_e}\gamma\left(\frac{Z-Z_C}{n}\right)^{\alpha}\right]^{\frac{1}{1-\gamma}} \qquad [14]$$

Given that $p_e = \rho - \lambda(p_c + p_s)Z_C$, $(p_c + p_s)Z_C = R$, and $1 - \gamma = \alpha,$ we obtain the equilibrium level of farming input as follows:

$$e = \left[\frac{p_m}{p_e}\left(\frac{Z-Z_C}{n}\right)^{\alpha}\gamma\right]^{\frac{1}{\alpha}} = \left[p_m\left(\frac{Z-Z_C}{n}\right)^{\alpha}\gamma\right]^{\frac{1}{\alpha}}(\rho-\lambda R)^{\frac{-1}{\alpha}} \quad [15]$$

i.e. e is increasing in λ and R.

With e=$\bar{e}$ in equilibrium, equilibrium income is given as:

$$\bar{F} = \left(\frac{Z-Z_C}{n}\right)^{\alpha}\{\left[p_m\gamma\left(\frac{Z-Z_C}{n}\right)^{\alpha}\right]^{\frac{1}{\alpha}}(\rho-\lambda R)^{\frac{-1}{\alpha}}\}^{\gamma}p_m - p_e\left[p_m\gamma\left(\frac{Z-Z_C}{n}\right)^{\alpha}\right]^{\frac{1}{\alpha}}(\rho-\lambda R)^{\frac{-1}{\alpha}} \quad [16]$$

The investor company

The representative investor company produces a cash crop (e.g. rubber) or a staple food crop (e.g. rice), using inputs, e_C, leased or purchased farmland, Z_C, and hired labour, L_C. We initially assume that all output is exported, i.e. the fraction of the investment farm's harvest that is sold on the market is equal to one. The crop is produced according to a Cobb-Douglas function:

$$y_C = Z_C^{\alpha}L_C^{\eta}e_C^{\kappa} \quad [17]$$

where α, η, κ are factor shares satisfying the constant returns to scale condition ($\alpha+\eta+\kappa=1$), with $\alpha, \eta, \kappa \in (0,1)$. The labour input constraint is:

$$L_C \leq 1-n \quad [18]$$

where 1-n is the total number of displaced smallholders. Under perfect competition, the foreign company pays a market clearing wage of

$$\omega = \eta Z_C^{\alpha}e_C^{\kappa}(1-n)^{\eta-1} \quad [19]$$

to labourers and uses the amount of inputs $e_{C,}$, where $\eta-1<0$ by definition. Adjustment takes place via the wage rate. The foreign company is assumed to employ all displaced farmers but potentially at a very low wage, because of the limited employment opportunities on investment farms. By assuming that there is no intra-group inequality, i.e. wage employment is equally shared among all displaced farmers (available food is also shared equally) we impose some social sharing norms.

The capital rent r is:

$$r = \kappa Z_C^{\alpha}L_C^{\eta}e_C^{\kappa-1} \quad [20]$$

The surplus of the company is:

$$\pi_C = (1-\kappa-\eta)\, Z_C^{\alpha} L_C^{\eta} e_C^{\kappa} - (p_z + p_s) Z_C \quad [21]$$

Since the company is assumed to be a price-taker in input markets including that for capital, the optimal level of input use at the maximum amount of labour is given by:

$$e_C = \left[\frac{\kappa Z_C^{\alpha}(1-n)^{\eta}}{r}\right]^{\frac{1}{1-\kappa}} \quad [22]$$

When we substitute this into the market clearing wage, we get:

$$\omega = \eta Z_C^{\alpha}\left[\frac{\kappa Z_C^{\alpha}(1-n)^{\eta}}{r}\right]^{\frac{\kappa}{1-\kappa}} (1-n)^{\eta-1} = \eta\left(\frac{\kappa}{r}\right)^{\frac{\kappa}{1-\kappa}} Z_C^{\frac{\alpha}{1-\kappa}} (1-n)^{\frac{\eta-1+\kappa}{1-\kappa}} \quad [23]$$

The wealth of the worker is then:

$$W_w = \omega - p_m c_m = \eta Z_C^{\alpha} e_C^{\kappa} (1-n)^{\eta-1} + p_s - p_m c_m \quad [24]$$

And the total wealth of the local community (farmers and workers) is the sum of (7) and (24):

$$W = W_w + W_f = \eta Z_C^{\alpha} e_C^{\kappa} (1-n)^{\eta-1} - p_m c_m + (z_f^{\alpha} e_f^{\gamma} - c_a - p_e e_f) p_m + RM - p_m y_m \quad [25]$$

4. Welfare effects of farm investments

In analysing the welfare effects of farm investments on the local rural community, we depart from an equilibrium situation where everyone in the local community is a farmer and all farmers are equally productive. After the entry of the investor, the local community is divided into two groups: farmers and agricultural wage labourers on the investment farm. For these groups, we consider two scenarios A and B, which in a stylized way capture different possible consequences of large-scale land investment for the local population.

In scenario A, which we call the *staple food crops* scenario, the investor grows food crops such as maize or rice for export. The production technology adopted by the foreign-owned company is capital-intensive. All displaced farmers find work on the investment farm, i.e. the amount of freed labour through displacement is equal to the amount of labour employed on the farm. Knowledge or infrastructure spillovers do not exist due to missing linkages between the investment farm and local farmers.

In scenario B, which we call the *cash crops* scenario, the investor grows cash crops such as rubber and palm oil for export. Crop production on the investment farm is labour-intensive. As in scenario A, all displaced farmers shift to wage employment. Smallholders staying on their plot are assumed to benefit from spillovers because the higher labor intensity of production on the investment farm facilitates the establishment of linkages through contract farming.

Against the background of these stylized scenarios, we now derive the welfare effects of land investments for the affected population.

Proposition 1: the larger the amount of displaced people $(1-n)$*, the lower the wage.*

Differentiating the wage equation (23) yields:

$$\vartheta\omega/_{\vartheta n} = -\frac{\eta-1+\kappa}{1-\kappa}\,\eta(\frac{\kappa}{r})^{\frac{\kappa}{1-\kappa}} Z_C^{\frac{\alpha}{1-\kappa}}(1-n)^{\frac{\eta-2+2\kappa}{1-\kappa}} > 0 \text{ because } \frac{\eta-1+\kappa}{1-\kappa} < 0 \qquad [26]$$

where, by definition, $\Delta n > 0$ implies $\Delta(1-n) < 0$. We assume that when n is larger more people are displaced, which may simply reflect that a higher population density leads to more displacement. A complementary explanation is that farm labour needs increase less than proportionately with farm size (economies of scale), but displacement increases proportionately.

Proposition 2: the more labour- intensive the production, the higher the wage.

Solving the condition for constant returns to scale for the labour share $(\eta = 1-\kappa-\alpha)$, and using the market-clearing wage from equation 23, we obtain:

$$\vartheta\omega/_{\vartheta\eta} = (\frac{\kappa}{r})^{\frac{\kappa}{1-\kappa}} Z_C^{\frac{\alpha}{1-\kappa}}(1-n)^{-\frac{\alpha}{1-\kappa}} > 0 \qquad [27]$$

where $(1-n) > O$ by its definition as the number of displaced people.

Proposition 3: Higher food prices harm wage workers; the effect on smallholders depends on the net size of their marketed farm surplus.

Farmers are able to increase their wealth W_f if they generate a surplus to be sold on the market which exceeds their consumption of food bought on the market:

$$\partial W_f / \partial p_m = (z_f^\alpha e_f^\gamma - c_a - p_e e_f) - y_m \quad [28]$$

This holds assuming that the household's food consumption is constant and that prices rise equally for all kinds of food required by the farmer. The direction of the price effect depends on the level of inputs, e_f, and thus on farm productivity.

Wage labourers' wealth W_w decreases when p_m increases because they face a higher bill for their given amount of food consumption:

$$\partial W_w / \partial p_m = - c_m < 0 \quad [29]$$

Aggregating the two effects yields:

$$\partial W / \partial p_m = \partial W_f / \partial p_m + \partial W_w / \partial p_m$$

$$= (z_f^\alpha e_f^\gamma - c_a - p_e e_f) - y_m - c_m \quad [30]$$

$\partial W / \partial p_m > 0$ if $(z_f^\alpha e_f^\gamma - c_a - p_e e_f) > y_m + c_m$. For the price effect to be positive, the marketed food surplus therefore has to exceed the combined consumption of traded food products by smallholders and farm workers.

Proposition 4: Spillovers lower prices of modern inputs and thereby raise smallholder production and income.

Spillovers reduce input prices by definition ($p_e = \rho - \lambda R$). The partial derivative of farmers' income with respect to input prices is negative:

$$\partial \bar{F} / \partial p_e = -[p_m \gamma]^{\frac{1}{\alpha}} \left(\frac{Z - Z_C}{n}\right) (\rho - \lambda R)^{\frac{-1}{\alpha}} < 0 \quad [31]$$

Proposition 5: The overall welfare effects depend on spillovers, the wage level, and food prices.

Note that so far we have excluded the terms of the land transaction - including possible compensation payments - from the analysis and therefore focus only on wealth levels after the investment farm has been established. Assuming that production on the investment farm is export-oriented in both scenarios the following reasoning applies.

a) For the staple food crop scenario, we obtain: $\omega < F$, $\Delta p_e = 0$ (no spillovers), $\Delta p_m > 0$ (food prices rise).

   The maximum wage in our model is $\omega = F$. If $\omega > F$ there would be no displacement and farmers would voluntarily switch from own production to wage employment. In the staple food crop scenario, the labour share among production inputs, η, is small and therefore $\omega < F$. This implies a low wage rate for all workers because we do not model intra-group inequality. Former farmers who are now wage-employed need to buy all their food on the local market. Food prices are expected to rise as the area available for food production by the local community shrinks by the size of the investment farm. Workers are then clearly worse off due to both lower wages and rising food prices. The remaining smallholders are better or worse off depending on whether they are net sellers or buyers of food. Given that the latter is frequently the case in Sub-Saharan Africa, on balance farmers can also be expected to lose. Hence, the overall welfare effect is negative except for the unlikely situation where the remaining farmers are net food sellers and gain more from rising food prices than workers lose. Inequality between workers and smallholders always increases in this scenario. Note that this result would likely remain the same even if the investment farm sells part of its harvest on the local market. Only if the amount sold on the local market exceeds the amount previously produced by the displaced smallholders, food prices would be expected to fall and could (partially) offset the negative effects from low wages.

b) For the cash crop scenario, we obtain: $\omega = F$, $\Delta p_e < 0$ and thus $\Delta F > 0$, $\Delta p_m <=> 0$ (sign of food price effect not clear).

   With labour intensive production in this scenario, the displaced farmers are assumed to earn up to $\omega = F$, the maximum wage in the model. As in the previous scenario, former farmers who are now wage employed need to buy all their food on the local market. Food prices can rise, remain constant or fall, depending on the intensity of spillovers. They fall if the productivity improvements on the land cultivated by the remaining farmers are so large that they overcompensate for the outflow of crops from the investment farm. In this case, welfare effects are likely to be positive: displaced workers gain if they earn a wage close to their former farm income and benefit from lower food prices; the remaining farmers are better off due to spillovers[7] and also benefit from lower food prices if they are net consumers. When food prices rise, workers are worse off. The same may also hold for smallholders given that rising food prices are associated with low levels of spillovers.

Compensation payments

We have so far neglected that host country governments or investors have the option to compensate the smallholders affected by land investments for the losses they incur. We now discuss at what size compensation payments would leave the affected population at least as well off as without the investment[8].

We first consider the amount of money that guarantees that farmers who lose their land are not made worse off. The minimum size of payment p_s future workers could demand as a compensation for foregone income and rising food expenditures in periods t = 0, …,T is:

$$p_s = \sum_{t=0}^{T} \frac{F-\omega+\frac{\Delta p_m}{\omega}}{(1+i)^t} \qquad [32]$$

where i denotes the interest rate with which future flows are discounted. The remaining smallholders may also experience losses through rising food prices (if they are net buyers of food) or through falling food prices (if they are net sellers). For them, compensation payments would amount to:

$$p_F = \sum_{t=0}^{T} \frac{\Delta\bar{F}+\Delta p_m(y_m-(z_f^{\alpha}e_f^{\gamma}-c_a-p_e e_f))}{(1+i)^t} \qquad [33]$$

We assume that compensation payments for farmers cannot become negative even if they gain from the investment, i.e. $p_F \geq 0$.

Taking the whole local community into account the minimum compensation payment P then is:

$$P = \sum_{t=0}^{T} \frac{F-\omega+\frac{\Delta p_m}{\omega}+\Delta\bar{F}+\Delta p_m(y_m-(z_f^{\alpha}e_f^{\gamma}-c_a-p_e e_f))}{(1+i)^t} \qquad [34]$$

where $\Delta\bar{F}$ and Δp_m depend on the spillover parameter λ.

[7] This result holds if there is no offsetting negative spillover effect on local farmers due to competition for natural resources such as water and fertile land.

[8] In the somewhat different setting of farmers on sharecropping contracts displaced by acquisition of agricultural land for the purpose of industrialization, Ghatak and Mookherjee (2014) analyse how compensation rules affect ex-ante incentives for landlords and tenants to invest in improvements of agricultural productivity.

The minimum size of compensation payments for displaced farmers calculated above should be regarded as a lower bound of the payments actually required to make the farmers equally well off when being employed on the investment farm. There are several reasons why displacement could be involuntary even if $p_s > \sum_{t=0}^{T} \frac{F-\omega+\frac{\Delta p_m}{\omega}}{(1+i)^t}$. We discuss three possibilities: loss aversion, uncertainty and insurance.

First, when there is loss aversion farmers would value income from their current occupation, F, more than the prospective new one, ω, because of the prospect of giving up their own land. This increases the minimum size of the compensation payment that would lead farmers to leave their land voluntarily by the amount LA. Hence:

$$Min\ p_s = \sum_{t=0}^{T} \frac{F-\omega+\frac{\Delta p_m}{\omega}}{(1+i)^t} + LA \qquad [35]$$

Loss aversion can also be interpreted as a fixed cost of changing occupations. Second, when there is imperfect information about job opportunities on the investment farm, farmers may perceive the wage on the investment farm as uncertain, which is, for instance, likely when jobs are seasonal. Then,

$$Min\ p_s = \sum_{t=0}^{T} \frac{F-\varphi\omega+\frac{\Delta p_m}{\omega}}{(1+i)^t} \qquad [36]$$

where *(1- φ)* is the rate of uncertainty.

Third, the role of land as insurance against unemployment, illness, old age and potentially also food price shocks is not captured in the current model. In many African countries with no or insufficient insurance mechanisms, land serves as a fall-back option for hard times. When this is taken into account the value of the land for the smallholder is in fact higher than just the foregone profit from farming. Then,

$$Min\ p_s = \sum_{t=0}^{T} \frac{F-\omega+\frac{\Delta p_m}{\omega}}{(1+i)^t} + S. \qquad [37]$$

And of course, all three effects can be present at the same time. Then,

$$Min\ p_s = \sum_{t=0}^{T} \frac{F-\varphi\omega+\frac{\Delta p_m}{\omega}}{(1+i)^t} + LA + S \qquad [38]$$

Our model would then predict that farmers freely give up their farm and move to wage employment when the wage earned on the investment farm is higher than this minimum payment.

5. Discussion of model assumptions

In this section, we discuss the validity of several crucial assumptions made in our model analysis above, and whether these assumptions might affect outcomes for the local population.

Our model considers employment on the investment farm, possibly at a low wage, as the only option available for displaced farmers. We thereby neglect that jobs may be created further up the value chain, e.g. in processing industries, and that the investor may also offer skilled and better-paid employment. Yet, as argued above, the literature so far finds little evidence that this is indeed happening to a noticeable degree In fact, most agricultural production from Sub-Saharan Africa is exported non-processed. On a more speculative note, by reallocating human resources away from small-scale farming, wage employment in the foreign-owned company may facilitate transformation to higher-value non-farm jobs in the longer term despite being unfavourable in the short run (Milimo et al. 2011).

A possible outcome not modelled and beyond the scope of the paper is migration to other areas. This may happen in particular in the staple food crop scenario where labour intensity is low. If displaced farmers who do not find a job migrate, this reduces downward pressure on local wages locally. The welfare of the emigrating farmers depends on the job opportunities in their new location. As in the last case, migration may reallocate human resources away from small-scale farming and thus facilitate agricultural transformation in the longer run.

As concerns spillover effects, we assume that an investor who has to pay a higher price per unit of land will invest more in farming infrastructure and thereby increase spillovers compared to an investor who pays a lower price per unit of land. This implies a positive side-effect of increasing the price for the investor, but there is currently no empirical evidence supporting this assumption. Assuming non-dependence of the spillovers on the price paid by the investors simplifies equation (12) to $\rho - \lambda Z \geq 0$. This would not change the analytical conclusions derived in this paper, but the difference between the two specifications may be of empirical relevance. Furthermore, we neglect positive spillover effects due to general investments in community infrastructure, and also do not account for negative spillover effects that may arise if smallholders have to compete with investors in crop markets and for resources such as water. How modifying these assumptions would on balance change the outcome for smallholders is unclear.

The food price effects our model generates rest on several assumptions. First, we assume that as a result of the land acquisition food availability on local markets decreases in the absence of spillovers. While this requires investment farms to be export-oriented, it is in accordance with a small portion of non-exportable leftovers being sold on the local market, as long as these sales are lower than the quantities previously produced for the local market on the land acquired by the investor. We lack direct empirical evidence supporting this assumption, but Anseeuw et al.'s (2012, p. ix) conclusion based on the Land Matrix database that "domestic markets are of marginal concern" for investors points to its validity. In addition, it is consistent with a scenario of biofuel production on the investment farm. Many investors grow so called switch crops that can be used both for biofuel and food production (Anseeuw et al. 2012). Maize is such a typical switch crop. Second, in the model food prices rise when local supply decreases. This appears realistic given low market integration in many rural areas in Sub-Saharan Africa due to high transaction costs or incomplete information (see section 2). If market integration increased and investors had no significant market power, local prices would respond less to changes in local supply. This would benefit net food buying smallholders and displaced farmers. Finally, when food prices are not the same for all kinds of food as assumed in our model, more complex indirect effects can arise depending on which kinds of food farmers buy and sell and to which extent they substitute one kind for the other.

6. Concluding remarks

In this paper, we have developed a theoretical model that offers a comprehensive and flexible framework for analysing the implications of investments in farmland for the local population. The two main drivers of local welfare changes considered in the model are the labour intensity of production on the investment farm, which determines wage rates for displaced farmers, and the extent to which smallholders who stay on their plot can raise their productivity through spillovers. We have employed the model for two stylized scenarios that are based on different assumptions concerning these two factors: a cash crop scenario with labour-intensive production and spillovers and a staple food crop scenario with capital-intensive production and no spillovers.

The staple food crop scenario provides an illustration of the negative consequences large-scale land acquisitions may have, with falling wage income and rising food prices. In the current institutional setting of very limited compensation payments, displaced farmers run a particularly high risk of being made worse off. If production is labor-intensive and successful contract farming takes place as in the cash crop scenario, net welfare effects are more ambiguous. They can even be positive in the presence of significant spillovers, for which there is however little evidence so far.

Our theoretical analysis derives important transmission mechanisms that have to be taken into account when assessing how large-scale land acquisitions affect local welfare and whether local governments should promote new investments. In the end, the debate on whether these deals constitute a land grab or a development opportunity similar to other productive investments can only be resolved through empirical research. With the rising number of investment projects actually implemented it should increasingly become possible to estimate their employment and productivity effects empirically at the micro level using existing evaluation methods. In addition, simulations based on computable general equilibrium models may be the most appropriate tool for investigating the complex interactions between land investments and local food prices. These models allow developing scenarios with different assumptions about food market integration.

References

Adewumi, M.O., A. Jimoh, and O.A. Omotesho (2013). Implications of the Presence of Large Scale Commercial Farmers on Small Scale Farming in Nigeria: The Case of Zimbabwean Farmers in Kwara State. *Knowledge Horizons – Economics* 5: 67-73.

Aker, J., and I.M. Mbiti (2010). Mobile Phones and Economic Development in Africa. *Journal of Economic Perspectives* 24: 207-232.

Anseeuw, W., M. Boche, T. Breu, M. Giger, J. Lay, P. Messerli, and K. Nolte (2012). Transnational Land Deals for Agriculture in the Global South: Analytical Report based on the Land Matrix Database. CDE, CIRAD and GIGA. Bern, Montpellier, Hamburg.

Arezki, R., K. Deininger, and H. Selod (2011). What Drives the "Global Land Rush"? World Bank Policy Research Working Paper 5864. Washington, D.C.

Barrett, C.B. (2008). Smallholder Market Participation: Concepts and Evidence from Eastern and Southern Africa. *Food Policy* 33: 299-317.

Benjaminsen, T.A., I. Bryceson, F. Maganga, and T. Refseth (2011). Conservation and Land Grabbing in Tanzania. Paper presented at International Conference on Global Land Grabbing. Institute of Development Studies, University of Sussex, 6-8 April 2011.

Brown, T. (2005). Contestation, confusion and corruption: Market-based land reform in Zambia. In S. Evers, M. Spierenburg, & H. Wels (Eds.), Competing jurisdictions. Settling land claims in Africa. Leiden, Boston: Brill.

Das, G. (2012). Trans-border Land Acquisitions: A New Guise of Outsourcing and Host Country Effects. UNU-WIDER Working Paper 2012/43. Helsinki.

De Schutter, O. (2011). How not to think of land-grabbing: Three critiques of large-scale investments in farmland. *Journal of Peasant Studies* 38(2): 249–279.

Dessy, S., G. Gohou, and D. Vencatachellum (2012). Foreign Direct Investment in Africa's Farmlands: Threat or Opportunity for Local Populations? Centre Interuniversitaire sur le Risque, les Politiques Économiques et l'Emploi, Université Laval, Cahier de Recherche 12-03.

Deininger, K., and D. Byerlee (2012). The Rise of Large Farms in Land Abundant Countries: Do They Have a Future? *World Development* 40: 701-714.

Deininger, K., D. Byerlee, J. Lindsay, A. Norton, H. Selod, and M. Stickler (2011). Rising Global Interest in Farmland: Can it Yield Sustainable and Equitable Benefits? The World Bank, Washington, D.C.

Deng, D.K., A. Johansson, and S. Narula (2010), Foreign Land Deals and Human Rights: Case Studies on Agricultural and Biofuel Investment. Report of the Center for Human Rights and Global Justice, New York University School of Law.

Diallo, A., G. Mushinzimana (2009). Foreign Direct Investment (FDI) in Land in Mali. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). Eschborn.

Ghatak, M., and D. Mookherjee (2014). Land Acquisition for Industrialization and Compensation for Displaced Farmers. *Journal of Development Economics*, forthcoming.

Heumesser, C., and E. Schmid (2012). Trends in Foreign Direct Investment in the Agricultural Sector of Developing and Transition Countries: A Review. University of Natural Resources and Applied Life Sciences, Vienna. Mimeo.

Ivanic, M., and W. Martin (2008). Implications of Higher Global Food Prices for Poverty in Low-Income Countries. *Agricultural Economics* 38: 339-348.

Locher, M. (2011). How Come that others are Selling our Land? Costumary Land Rights, Rural Livelihoods and Foreign land Acquisition in the Case of a UK-based Forestry Company in Tanzania. Paper presented at International Conference on Global Land Grabbing. Institute of Development Studies, University of Sussex, 6-8 April 2011.

Milimo, J.T., J.H. Kalyalya, H. Machina, and T. Hamweene (2011). Social impacts of land commercialization in Zambia: A case study of Macha mission land in Choma district. Study for the International Land Coalition.

Land Matrix (2013). The Online Public Database on Land Deals. Available online at www.landmatrix.org.

Nolte, K., and S.Väth (2013). The Interplay of Land Governance Systems and Large-scale Agricultural Investments: Evidence from Ghana and Kenya. Joint Discussion Paper Series in Economics 50-2013. Universities of Aachen, Gießen, Göttingen, Kassel, Marburg and Siegen.

Nolte, K. (2014). Large-scale agricultural investments under poor land governance in Zambia. *Land Use Policy* 38: 698-706.

Schoneveld, G.C. (2014). The geographic and sectoral patterns of large-scale farmland investments in sub-Saharan Africa. *Food Policy*, forthcoming.

Schoneveld, G.C., L.A. German, and E. Nutakor (2011). Land-based investments for rural development? A grounded analysis of the local impacts of biofuel feedstock plantations in Ghana. *Ecology and Society* 16: 10.

Suzuki, A., L.S. Jarvis, and R.J. Sexton (2011). Partial Vertical Integration, Risk Shifting, and Product Rejection in the High-value Export Supply Chain: The Ghana Pineapple Sector. *World Development* 39: 1611-1623.

Swinnen, J. (2009). Reforms, Globalization, and Endogenous Agricultural Structures. *Agricultural Economics* 40: 719-732.

Tsikata, D., and J. Yaro (2011). Land Market Liberalization and Trans-National Commercial Land Deals in Ghana since the 1990s. Paper presented at International Conference on Global Land Grabbing. Institute of Development Studies, University of Sussex, 6-8 April 2011.

Veldman, M., and M. Lankhorst (2011). Socio-economic impact of commercial exploitation of Rwandan marshes: A case study of sugar cane production in rural Kigali. ILC; CIRAD; RCN Justice & Démocratie. Rome.

Table 1: Land Matrix projects with reported displacements

displaced people	number of projects
up to 999	15
1000 – 2499	5
2500 – 4999	4
5000- 10000	6
more than 10000	10

Source: Anseeuw et al. (2012).

Table 2: Reported displacements in Sub-Saharan Africa

destination country	country of origin	land size (ha)	crop
Zambia		155 000	Various crops
Mali	Libya	100 000	rice
Mozambique	UK	30 000	Sugarcane
Tanzania	UK	8 211	Jatrpha
Zimbabwe	South Africa/Zimbabwe		Sugarcane/Livestock
Zimbabwe	South Africa/Zimbabwe	376 995	Sugarcane/Livestock
Rwanda	UK/USA	10 000	Jatropha
Mozambique	UK	30 000	Sugarcane
Zambia		3 003	Jatropha
Sierra Leone	Switzerland	40 000	Sugarcane
Ghana	Norway	10 600	Jatropha/Maize
Liberia		14 999	Rice
Congo		10 000	Maize
Kenya	Kenya		
Sierra Leone	Switzerland	40 000	Sugarcane
Kenya/Tanzania	Kenya/Tanzania		
Zimbabwe	South Africa		Sugarcane
Mali	Libya	100 000	Rice
Zambia	UK/South Africa	31 700	Sugarcane
Uganda	Germany		
Tanzania	UAE		
Mozambique		26 000	Forestry
Uganda	Uganda	1 000	
Ethiopia	Israel	140 000	castor beans
Ethiopia	Israel	140 000	castor beans
Sierra Leone	Switzerland	40 000	sugarcane
Kenya	UK	28 911	crambe, castor, sunflower, oil proc.
Kenya	Kenya	20 000	sugercane, agrofuels
Zambia		200	jatropha
Tanzania	Sweden	22 000	sugarcane, ethanol
Kenya	USA	17 500	rice
Kenya	USA	17 500	rice
Uganda	Germany		coffee
Kenya	Italy	50 000	jatropha
Tanzania	Sweden	400 000	sugar cane
Zimbabwe	South Africa	40 000	Sugarcane
Ghana	USA/Ghana	3 250	Rice
Ghana		14 000	Jatropha
Tanzania		14 704	Forestry
Mozambique		30 000	Sugarcane
Kenya		6 900	Rice
Ghana	Belgium	14 153	Palm Oil
Tanzania	UK	8 211	Jatropha
Tanzania	UK	5 818	
Tanzania		28 132	Teak
Tanzania	Netherlands/Tanzania	10 000	Jatropha
Tanzania	Norway	100 000	Forestry

Source: Authors’ literature review.

Table 3: Reported Spillovers

destination country	country of origin	size (ha)	crop	jobs	business model	agricultural investments	general investments	knowledge transfer
Ghana	UK		fruit	yes, 60% permanent staff	contract farming			technical training, advice for farmers, but no credits
Kenya	Kenya		rice		contract farming			
Ghana	Italy	105 000	Jatropha		outgrower scheme	provision of organic compost and farm machinery (company information)		
Ethiopia	Germany	10 000	castor beans		Contract farming			
Kenya	Belgium	42 000	sugarcane		outgrower scheme			
Ethiopia	Brazil	18 000	Sugarcane/ Sugarbeet		outgrower scheme and nucleus estate			
Ethiopia	Israel	2 700	castor beans		outgrower scheme and nucleus estate			
Mali	Libya	100 000	rice	intends to engage local farmers as agricultural workers, for low-skilled jobs, for jobs requiring skilled labor Chinese workers will be employed		water channel, lack of irrigation water for fields	road	
Mali	Mali, South Africa, USA	14 100	sugarcane					
Kenya	Qatar	40 000	fruits, vegetables			US$2.5 billion loan to build a second deepwater port		
Kenya	Italy	50 000	jatropha					
Southern Sudan	Norway	179 000	timber	commitment to employ local population (nothing about extent or scope of employment)		increased competition over grazing land among pastoralists (company claims to set aside land solving this problem), reduced water availability, might increase competition on resources	community support programme (still developing), investment of US$ 3 million for developing property, commitment of supporting school facilities, roads, water systems	
Tanzania	Sweden	22 000	sugarcane, ethanol	intends to hire local community members		may build infrastructure to support biofuel industry, water shortage and reduced grazing land, reduced access to firewood and charcoal		

Table 3 cont.

destination country	country of origin	size (ha)	crop	jobs	business model	agricultural investments	general investments	knowledge transfer
Zambia		200	jatropha	employment on farm and accociated commercialization (school, café, restaurant,...), mostly full-employment			development of infra-structure/services, that was absent before (radio, restaurant, guesthouse, airstrip, internet café, private school)	
Kenya	Qatar	40 000	fruits, vegetables			US$2.5 billion loan to build a second deepwater port		
Tanzania	Norway	100 000	Forestry	wages below Tanza-nian minimum wage, bad working conditions			10% of profits from carbon credit system	
Ghana		23 762	Jatropha/ Maize	total: 400 local: 240				
Sudan	Norway	179 000	Forestry			donation of community tractor for transportation	forestry scheme for community (company statement), creation of livelihood alternatives/ alternative jobs (company statement)	
Tanzania	UAE						support of local development projects (health, education)	
Tanzania	USA	140 000						
Tanzania		14 704	Forestry				feeder roads	
Zimbabwe	South Africa		Sugarcane		outgrower scheme and nucleus estate	irrigation and logistics services for displaced farmers		
Zimbabwe	South Africa/Zimbabwe		Sugarcane/ Livestock					
Zimbabwe	South Africa/Zimbabwe	376 995	Sugarcane/ Livestock					
Ghana	Norway	10 600	Jatropha/ Maize			grinding mill, community tractor (later withdrawn), loss of lifelihoods after bankruptcy (employees on the farm had stopped subsistence farming), food shortages, especially after bankruptcy	medical transport to city in case of serious illness, teacher for primary school	
South Africa	South Africa	2 000	Maize		rental and operation	borehole construction, perceived increased loss in standard of living due to external food dependency		

Table 3 cont.

destination country	country of origin	size (ha)	crop	jobs	business model	agricultural investments	general investments	knowledge transfer
Ethiopia	Israel	140 000	castor beans	5000 hired labour, 84 000-124 000 outgrowers	outgrower scheme and nucleus estate	processing plant, provision of seeds, fertilizers killed bees and thus a complementary source of income		knowledge transfer
Ethiopia	Ethiopia	9 200	Sugarcane		outgrower scheme			
Sierra Leone	Switzerland	10 000						training programs for smallholders
Sudan	USA	600 000					40-50% of project profits to community	
Sudan	Norway	179 000					assistance with development projects	
Sudan	Egypt	105 000					construction of health clinic	
Tanzania	UK	5 818				seeds for first season, technical equipment, two irrigation canals	land for resettlement	
Rwanda		3 100	Sugarcane	400 at the mill, 80 guards, 80 overseers, 8 supervisors, 4000-5000 day farmers on estate, 2000-3000 outgrowers	outgrower scheme with nucleus estate	renovation of processing facility		
Mozambique	UK	1 850	Horticultural		outgrower scheme and nucleus estate			
Tanzania	Netherlands/ Tanzania	10 000	Jatropha	3000 outgrowers field officers		10 year minimum price for jatropha seed, enhancement of crop productivity, no competition with food security as it is only planted as a hedge		training for outgrowers
Tanzania	Netherlands/ Tanzania		Jatropha		outgrower scheme			
Congo		24 000	Various	1282			230-bed hospital; secondary school; provision of housing, electricity and clean water, social benefits for workers	
Zambia	UK/South Africa	31 700	Sugarcane	300 outgrowers	outgrower scheme and nucleus estate	eutrophication of fishing grounds, pollution through cane burning		
Tanzania	Netherlands	4 455	Jatropha/ Livestock			limited access to grazeland, firewood and water, increased local income by introduction of beekeeping, chemical pollution and introduction of novel plants		

Table 3 cont.

destination country	country of origin	size (ha)	crop	jobs	business model	agricultural investments	general investments	knowledge transfer
Tanzania		28 132	Teak	230	outgrower scheme and nucleus estate	processing plant $0.15mn for social projects of a community fund		
Sudan	Syria	12 600				irrigation systems also for auxiliary farmland		
Angola		25 000	rice		contract farming			
Madagascar		170 914			outgrower scheme and nucleus estate			
Mozambique	UK	30 000	Sugarcane	150, 3000 - 7000 under full operation	outgrower scheme and nucleus estate	competition to food security as project located on highly fertile land with suitable agriculture, potentially: competition for water resources for irrigation, deforestation		knowledge transfer
Tanzania	Belgium/ Tanzania	5 000	Oil Palm		outgrower scheme and nucleus estate			knowledge transfer
Tanzania	Sweden	22 000	Sugarcane		outgrower scheme and nucleus estate	potential: adverse effects on water supply of surrounding settlements		
Tanzania	Netherlands	3 500	Jatropha	4 000 contract farmers	contract farming			
Tanzania	UK	8 211	Jatropha		outgrower scheme and nucleus estate			
Ethiopia	Israel	140 000	castor beans	5000 hired labour, 84 000-124 000 outgrowers	outgrower scheme and nucleus estate (abandoned?)	processing plant		knowledge transfer
Ethiopia	Ethiopia	9 200	Sugarcane		outgrower scheme			
Sudan		42 600	various				infrastructure	
Sudan		179 999	forestry				infrastructure ($3mn)	
Mali		20 245	Sugarcane		outgrower scheme and nucleus estate	processing plant		
Madagascar		170 914	various food crops		contract farming			
Liberia		8 011	Oil Palm		outgrower scheme			
Mali	Netherlands/Mali		Jatropha		outgrower scheme	small processing plant		technical assistance, access to inputs
Zambia	South Africa/ India/Zambia	12 000	Jatropha/ sugarcane/ palm oil	25 000 outgrowers, 96 field officers, 180 coordinators	30-year contract farming with prices determined by spot market, outgrower scheme and nucleus estate (abandoned?)		5% of profits to outgrower community	service and marketing facilities for outgrowers

Table 3 cont.

destination country	country of origin	size (ha)	crop	jobs	business model	agricultural investments	general investments	knowledge transfer
Ghana	Belgium	14 153	Palm Oil	1000-2000	outgrower scheme and nucleus estate	boreholes	kindergarden, secondary school, road infrastructure, clinic, electricity poles	
Ghana		6 779		500-1200	outgrower scheme and nucleus estate			
Ghana		6 799		500-800	outgrower scheme and nucleus estate			
Ghana	Norway	4 554		500	outgrower scheme and nucleus estate			
Ghana	Ghana	400		35	outgrower scheme and nucleus estate			
Tanzania			Jatropha		voluntary contract farming with fixed minimum price	free seeds for initial phase	awareness training for AIDS	agricultural knowledge transfer
Ghana		14 000	Jatropha	120	leasing with hired labour			

Source: Authors' literature review.