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Foreign Direct Investment in Sub-Saharan Africa: Drivers and the Challenge of the Land-Energy Nexus

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FOREIGN DIRECT INVESTMENT IN SUB SAHARAN AFRICA: DRIVERS AND THE CHALLENGE OF THE LAND-ENERGY NEXUS

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1. Introduction

«It's time for Africa. […] There is an increasing recognition that the continent is on an upward trajectory; economically, politically and socially» (Ernst and Young, 2011, p. j). In Sub Saharan Africa capital inflows –mainly from the South- in 2011 reverted to the peak of 2008 and several countries are considered amongst the world most attractive according to the UNCTAD FDI attraction index (UNCTAD, 2012). Indeed, during the last decade, several developing countries have attracted substantial amounts of private capital. Due to limited domestic resources, private sector expansion, however, has been heavily dependent on external capital resources. This is particularly true in Sub-Saharan Africa (SSA), characterized by very low tax base and saving rates (OECD and AfDB, 2010). Amongst foreign sources, official aid assistance has been increasingly put into discussion, while foreign direct investments and remittances are becoming more and more central. In particular, it has been maintained that foreign direct investment has the potential to contribute "to accelerating growth and progress towards reaching development goals in Africa" (Ndikumana and Verick, 2008, p. 2).

Benefits of FDI, however, do not come automatically and the existing literature suggests that, despite the surge of foreign private capital until the

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2008-2009 global economic crisis, the growth and developmental impact in many developing countries have been limited. Reiter and Steensma (2010) show that findings about the role of FDI in economic development are still mixed; Wooster and Diebel (2010, p. 641) conclude that «evidence of intrasectorial spillovers from FDI in developing countries is weak, at best», while van Hulten and Webber (2010) find that even in rich and institutionally advanced economies net capital inflows are more strongly associated with past economic growth than with future economic growth. In line with these results, Ndikumana and Verick (2008) find that the impact of private domestic investment on FDI is stronger and more robust than the reverse relation. This suggests that strong private domestic investment record is likely to act as a signal and attract also foreign capital, while the role of FDI as propulsive engine of economic growth is less evident.

The heterogeneity of evidence on the developmental impact of foreign direct investments is explained by resorting to a wide range of arguments from the institutional and legal contexts to the technological gap, the level of human capital of host economies and the development of financial markets[1]. Content and sectoral allocation, as well as the amount of FDI, are crucial to confidently assess the development impact of FDI. Chakraborty and Nunnenkamp (2008), for instance, shows that growth effects of FDI in India vary widely across sectors. Analogously, the cross-country panel analysis by Bonassi *et al*. (2006) suggest that the developmental impact cannot be computed at the aggregate level. If the impact of FDI in the primary sector is considered to be limited or even negative, more far reaching positive connections and spillovers are expected in the case of capital flow into the manufacturing or some parts of the service sector (UNCTAD, 2001; Aykut and Sayek, 2007; Doythc and Uctum, 2011). Not only the growth effects differ, in terms of stimulus on domestic consumption and employment, but also the externalities are different. For instance, some investments in water intensive manufacturing industries can have positive growth effects in the short run but negative impacts in the long run because of depletion of resources or pollution[2]. The prevalence of

1. See for instance, Alguacil *et al.* (2011), Alfaro *et al.* (2004), Blomstrom *et al*. (1994), Balasubramanyam and Sapsford (1996), Borensztein *et al*. (1998), Kemeny (2010), Lim (2001), Reiter and Steensma (2010), Narula and Driffield (2012).

2. There has been in the literature a debate on the so called “dirty industries”, which tend to be highly water intensive and water polluting and when environmental laws become more restrictive in developed countries are outsourced to developing countries (often in those with weak institutions). For instance, water is used intensively in textile production (for cleaning,

crowding in (out) effects can also be sector-specific[3].

Based on this evidence, the present work adopts a sector-specific approach contributing to the literature on sector-level characteristics of FDI in SSA, which, to our knowledge, lacks systematic studies especially because of limited data availability on foreign capital flows at sector level. Given the very recent release of a cross-country dataset on large scale land acquisitions (Land Matrix), we concentrate on investment in land. This type of investment (often called "land grabbing") offers an interesting case study as it is experiencing a strong acceleration over the last year and is at centre of a heated debate for its potential social, economic and environmental implications. A recent report of the High Level Panel of Experts on Food Security and Nutrition commissioned by the UN Committee on World Food Security, for example, drawing on available evidence, concludes that «large scale investment is damaging the food security, income, livelihoods and environment for local people» (HLPE, 2011, p. 8). We discuss the pattern of international large-scale land acquisitions towards Sub-Saharan African countries and we find that some of the features and forces of this rush for African land raise concerns on its equity and sustainability: not all projects are implemented and the growing interest in land deals seems mainly dominated by foreign investors with the purpose to overcome limits of the agricultural biocapacity base of their economies or to exploit opportunities of speculative operations due pressure on food, land and energy prices. These findings are integrated and consistent with an econometric analysis of biofuel-oriented FDI in land. More precisely, we implement a Zero Inflated Poisson model to estimate the number of large scale international land deals for biofuels in Sub Saharan countries and we find that land availability and abundance of water resources combined with weak land governance are significant drivers.

The paper is organized as follows. It first discusses recent patterns of (domestic and) foreign investment in Sub-Saharan Africa at aggregate level. With the help of quantitative data and qualitative information from different sources, it then presents a descriptive picture of land FDI on the

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bleaching, dyeing etc.), where several high labor intensive phases of productions are offshored; also food manufacturing, thermal power, integrated circuits and electronic components, pulp and paper industries are water intensive and highly polluting and often delocalized in developing countries. See for instance, Grether and de Melo (2003).

3. Eregha (2011) by estimating the dynamic links between domestic investment and FDI in ECOWAS, highlights the importance of sector: in manufacturing crowding in prevails, while, in the primary sector, it is crowding out to prevail.

continent and of its drivers (Section 2) concentrating on biofuel-related land acquisitions. Section 3 estimates covariates of land demand for biofuel crops and Section 4 concludes.

2. Trends in Investments to Sub Saharan Africa

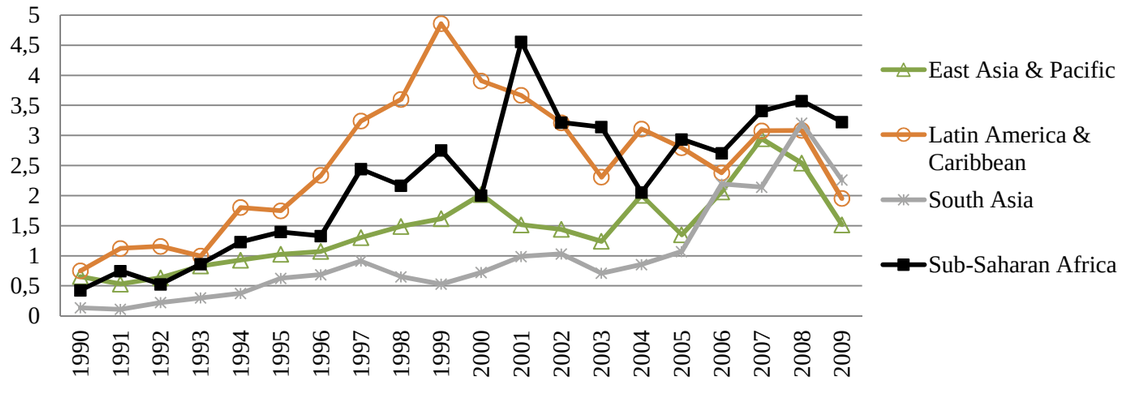
2.1. Putting FDI in Land to Sub-Saharan Africa into Perspective

This section provides a general overview of trends in investments in Sub-Saharan Africa. This is certainly the first element of analysis for a clear understanding of drivers and characteristics of the ongoing wave of transnational land acquisitions experienced by the continent.

To start with, we can observe that the last decades have witnessed significant increase both in domestic capital and in the inflows of foreign direct investment to developing countries. The existing gap between domestic savings[4] and desired level of investment in many of these countries has been filled by the transfer of resources from outside, FDI being very relevant. Indeed in the 1990s, FDI were around 30% of total investments, in 2010 around 50% of total. Furthermore, in 2010, for the first time, flows to developing and emerging countries "absorbed more than half of FDI global flows" (OECD *et al.*, 2011), showing a marked change from the past and this trend is confirmed for 2011 (UNCTAD, 2012).

4. Low savings rate, in turn, can be explained by the low and volatile incomes and the demographic structure of African populations, which are dominated by young age-groups, high illiteracy rates, and low life expectancy. See Beck *et al.* (2011).

Figure 1 - FDI to developing countries, % of GDP



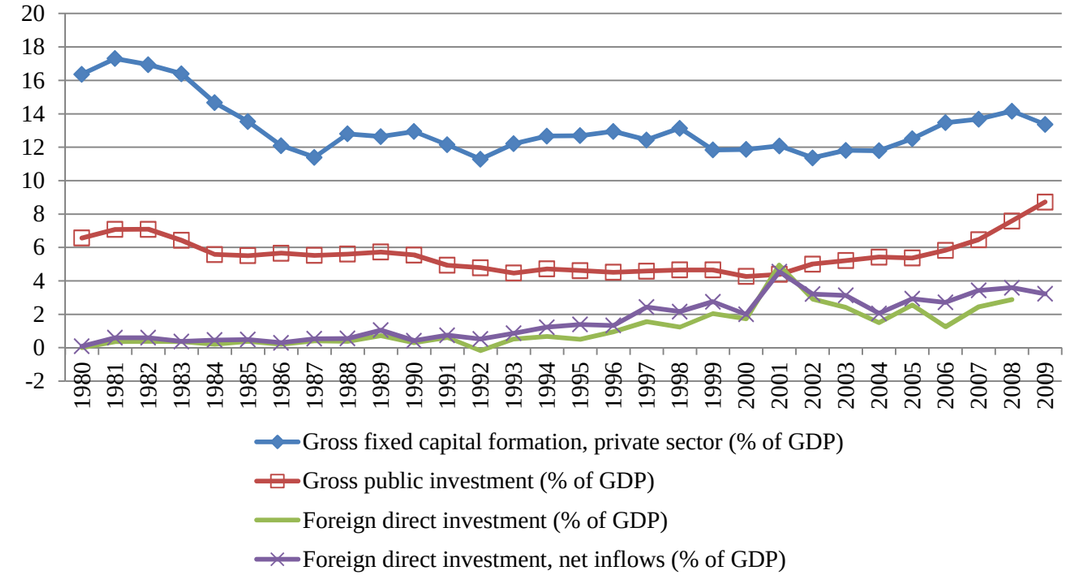
Source: World Development Indicators, 2011.

Figure 1 shows that the last two decades are still characterized by marked differences in levels and patterns of FDI as a percentage of GDP between different groups of developing countries. Up to the year 2000, middle income countries (especially in Latin America) have benefited more from foreign flows, while low income and Sub-Saharan countries have been left behind, also because of higher investment risk, low liberalization and weak infrastructures. Since 2000, however, there has been a rapid increase of capital flows even in low income countries. According to the African Economic Outlook (2011), total investment flows to Africa increased almost fivefold form 2000 to reach 126 billion dollar in 2010. FDI to (some countries in) SSA had been increasing in absolute terms and as a share of GDP, fuelled by improved macroeconomic stability and investment environment and by high commodity prices. Indeed, several Sub Saharan Africa countries are resource-rich countries with potential high comparative advantage in extractive industries which, in fact, are a major area for foreign investments[5]. The increase in FDI inflows has been higher in Africa than in non-African emerging economies (though the level is still lower, as pointed out in the recent Report by Ernst and Young, 2011)[6]. This growth pattern continued till the global crisis of 2008-2009, which has reduced the total amount of funds and induced delays or cancellations of investment projects (Allen and Giovannetti, 2011). Over the last decade «FDI's share of gross fixed capital formation in Africa has, at 20%, been twice the global average and 8% above that of other developing countries» (African economic Outlook, 2011, p. 44). Indeed, also composition of investments in Africa changed in favor of FDI (against a decrease of official aid). Figure 2 displays the evolution of domestic and foreign investments in SSA countries as well as the private versus public investments (at home). The figure shows that, between 1980 and 1995, private and public domestic capital fell while FDI was low but fairly stable. After 1995 on average, FDI, together with public investment, has been growing relatively more that domestic private flows.

5. It worth observing, however, that in the last few years, many investors started to diversify, investing in tourisms, consumer products, constructions, telecommunications, financial sectors (see Ernst and Young, 2011, p. 31, Mc Kinsey 2010 and UNCTAD, 2011).

6. Since 2005 Africa has been attracting more FDI than ODA.

Figure 2 - Trends in FDI, Private and Public Investments, Aggregate Sub-Saharan Africa



Source: African Development Indicators, 2011.

Despite the marked improvement of the last few years, there are still a number of elements acting as deterrent for investments in African countries and, therefore, as potential explanation of their lagging behind: political risk and often inadequate human capital, macro-economic instability, low productivity, exchange rate volatility and lack of infrastructures[7] (see amongst others, Asiedu, 2002; Razafimahefa and Hamori, 2005; Khadaroo and Seetanah, 2007, Ernst and Young, 2011). When the environment is uncertain and property rights are not guaranteed, a significant obstacle to invest in a high risk continent is that contracts might not be enforceable and there is no commitment not to default. Recent research has pointed to the importance of a sound legal framework and stable political environment to attract foreign capital, as well as to the influence of a country's history of default. The existence of good institutions in general helps attracting (and keeping) FDI (Naudé and Krugell, 2007). However, this view is sometimes challenged for Africa, where some specific investments, for instance those in land and in "dirty industries", tend to be channeled in countries with weak governance to avoid strict rules and laws. Furthermore, according to Egger and Winner (2005) in the presence of excess regulation, weak enforcement rules and government bureaucracy, corruption serves as *helping hand* to foreign investors. In other words, in SSA, risk can be high, but profitability is high too, with competition in some sectors comparatively low. Warnholz (2008), for example, presents very interesting comparisons of profitability at macro and micro (firms) level, showing that investments in Africa (at least the countries of his sample) can be very profitable and that the main problem to be able to exploit the potentialities is the often low level of human capital.

In conclusion, the current great interest of international investors for land acquisition in Africa is embedded in a broader path characterized by a growing role of private and foreign component in capital formation of African countries and a general acceleration in FDI towards the continent. This trend is likely to be associated with a bundle of forces from international factors such as trends in commodity prices to domestic changes in institutional and economic environment. Within this general framework, the next section will try to delineate the specific characteristics of FDI in African lands with a special attention on biofuel-related land acquisitions.

7. Adequate public infrastructure (for instance through public investments) reduces the costs of doing business and increases the marginal return to investment.

2.2. A Snapshot of Main Features and Drivers of Large-Scale Land Deals in SSA

Land acquisition is not a new phenomenon: it dates back to colonial times[8]. Over the last fifty years, however, land deals have substantially risen. This is particularly true in the last decade, when domestic and foreign investors have extensively bought or leased land in developing countries. The debate on number, characteristics and impacts of this trend has been particularly lively in the last couple of years (Cotula *et al.*, 2009; Friis and Reenberg, 2010; Görgen *et al.*, 2009; GRAIN, 2010; Smaller and Mann, 2009; von Braun and Meinzen-Dick, 2009; Allan *et al.*, 2012). Nevertheless, information on the magnitude of the challenge, in terms of the amount and location of land concerned, on the state of the deals (concluded, planned, implemented), on the use of the land (agriculture, industry, tourism, mining etc.) and on the players involved is still very limited, often approximate, not always carried out with scientific rigor. In the following, we provide a general and schematic snapshot of possible drivers, features and scale of this phenomenon drawing information on existing quantitative and qualitative literature and on data from Land Matrix. Land Matrix is a dataset, released in April 2012, that records rural land deals that cover 200 ha or larger which have been reported since 2000 by media, international and non-governmental organizations, academic centers, and/or which have been posted in the dedicated portals of the International Land Coalition and of NGO GRAIN. It includes over 2,200 deals, but only about half have been made public because they have been triangulated and are considered reliable[9].

Data collected from media reports reveal that an estimated 56 million hectares might have been recently subject to bargaining in developing countries; in Sub-Saharan Africa land interested is estimated at 29 million hectares (Deininger *et al.*, 2011). According to Land matrix (2012), reported large-scale land deals in agriculture cover 83.2 million hectares of land in developing countries. Among them, signed agricultural land deals amount to 26 million ha (and in about 21 millions the production has

8. Potts (2012) highlights the lessons to be learned and the insights to be derived from the past.

9. In the following, information from the Land Matrix come from our direct elaboration of online data available at http://landportal.info/landmatrix and accessed in April 2012 or from the analytical reports released with the dataset (Anseeuw *et al.*, 2012a and 2012b).

started), 46 percent of which in Sub Saharan Africa.

Foreign investors in land (around 80% of the total) are mainly: (i) governments or state enterprises or state funds from oil rich countries with poor resources of arable land, water scarcity and harsh climate conditions or (ii) private companies from industrialized and emerging countries with large populations and rapid economic growth, investing mainly in agro-fuel projects (see, Deininger *et al.*, 2011). In addition to OECD countries, emerging economies are becoming relevant investors and South-South deals are increasingly common. The top 20 investor countries include also China, India, and Arab Gulf Countries, namely countries which face increasing demand for feed and renewable resources or which are poor in water resources and cultivable lands. For investor countries, overseas land acquisitions might represent a strategy of for improving domestic food security and reducing their dependence on high and volatile food prices[10].

FDI in land to SSA include projects in different sectors (agriculture, forestry, tourism, industry and mineral extraction. See also Table A1) but agricultural purposes represent more than 80% of land acquisitions and among these, land acquisitions for biofuel crops account for a share of about 60 percent both in terms of number of deals and in covered area (Land Matrix data). The production of biofuels, for example, has been the purpose of the majority of land deals in Ethiopia, Madagascar and Mozambique which are three of the top-destination countries of commercial land investment in Sub-Saharan Africa. Other sources suggest a lower, but still important, share. Evidence based on information posted between October 2008 and August 2009 on the blog of the NGO GRAIN (Deininger *et al.*, 2011), for instance, indicates that about a fourth of large scale land investments in Sub-Saharan Africa were negotiated to produce biofuels. Sub-Saharan Africa, indeed, is the main targeted region by land FDI for biofuel projects. According to the Land Matrix data, Sub-Saharan Africa attracted about 57 percent of worldwide large-scale land acquisitions to cultivate only crops that can be used as biofuel feedstocks involving 12 million hectares out of 26 million hectares acquired at global level for the same purpose. Finally, foreign investors appear to dominate land acquisitions for these crops in most African countries: in about 85 percent of cases, the lead investor for biofuel-related land deals in Sub-Saharan African countries is foreign.

Large-scale land deals are not always followed up by productive

10. A detailed description of the different players involved in large land deals is in HLPE (2011, pp. 16-17).

investments. According to Deininger *et al.* (2011), only 20% of announced investments have been followed through with agricultural production. Similarly, Land Matrix data (2012) indicate that only 25.3% of area covered by reported land deals is under production. However, this percentage increases to more than 80% when we consider the signed contracts.

Patterns and characteristics of large-scale international land deals in SSA mirror the factors that have been identified by the literature as possible drivers of this rush for African lands. Increasing demand for food, feeds, and bio-fuel and concerns for land and resource scarcity appear to fuel this phenomenon. Growing population and corresponding decline in the average amount of land per person, combined with a very uneven distribution of population growth, soil degradation, climate change impacts[11] put pressure on land resources and prices. World demand for energy has accelerated over the last two decades and fuel prices are above historical levels (e.g. a peak in 2008 - $150 per barrel- and the highest annual average price in history so far- $111 per barrel- of 2011). Moreover, this growth is expected to continue. World energy demand, by 2030, is estimated to be more than 40% higher than it is today (OPEC, 2010). At the same time, projections for future demand for food indicate an increase of around 70% by 2050 (HLPE, 2011), while improvement in the standard of life suggests an increase in the consumption of meat and dairy, with a consequent higher use of land and water. Against this background, non oil-producer countries might search new lands for improving their energy security since liquid biofuels can reduce the dependence on oil imports in an era of up pressures on fossil fuel prices and, unlike other sources of renewable energy, can be used in the transport sector without significant modification in the existing infrastructure. Growing interest in green economy has further contributed to increase the interest in biofuel energy. According to Cotula *et al.* (2008), for instance, bio-fuel expansion is expected to raise land demand to over 3% of arable land by 2030. On the other hand, governments in countries that do not have enough land and water to feed their populations can see land investments as way to guarantee secure food supply for their populations. In fact, it has been argued that water is the hidden agenda behind many land acquisitions (Woodhouse and Ganho, 2011). The purchase (or lease) of land results in investment in water in foreign

11. According to data reported in Friis and Reenberg (2010) the average amount of land per person has declined from around 7.9 ha in 1990 to around 2 ha in 2005 and the prediction for 2050 is approximately 1.6 ha.

countries. Any land has associated water rights and access[12]. In other words, water investment through land seems to come "for free" in the valuation given to land in the deals. At the same time, the widespread perception that Sub-Saharan Africa is still rich in unutilized lands suitable for cultivation has made the continent a preferable destination. In fact, a number of SSA countries are land abundant (Tanzania, Zambia and the DRC amongst others) though Sub-Saharan Africa is also characterized by very heterogeneous countries in terms of land availability[13] and lands perceived as "empty" and "idle" are often used on the basis of informal rights. It worth observing, however, that even countries with similar availability of land can have different levels of attraction for foreign investments; for instance because they have different institutional framework, geographical position (landlocked or close to the sea) or infrastructure endowments. A first look at the data seems to suggest, in a counterintuitive way, that quality of institutions is negatively correlated to number of deals. Tanzania, that has well assessed land rights, only transferred to foreign investors 50000 ha between 2004 and 2009, while countries with weak institutions or in situation of fragility gave away much more. Existing estimates indicate transfer of 2.7 million ha in Mozambique, 5 million ha in Sudan, 1.6 million ha in Liberia and 1.2 million ha in Ethiopia. Ethiopia, Madagascar and Sudan, furthermore, are the three countries with the larger number of individual land deals (Allan *et al.*, 2012; and Appendix, Table A1).

Combination of all these forces exerts upwards pressure on land prices. Due to relative scarcity, in fact, the value of agricultural land is increasing. According to von Braun (2008) and Castel and Kamara (2009), the price for agricultural land in the last decade has increased by about 16% in Brazil (where it is around US$5-6000 per ha), 31% in Poland and 15% in the US Mid-West in 2007(where it is around US$ 7000). In Sub-Saharan Africa, instead, the commercial value of land is still relatively low: despite large within country differences, according to Development Afrique (2009), the estimated average price per hectare in Africa is between US$800-1 000[14]. The UK's Agricultural Africa Land Fund for instance pays 350 – 500 USD per hectare in Zambia (about a tenth the price of land in Argentina or the USA and half of the average Sub Saharan Africa price). Furthermore, in

12. A clear analysis of the connection between land and water grabbing is provided by Rulli *et al.*, (2013).

13. Rwanda and Malawi, for example, are very land scarce (Deininger, 2011).

14. See the table A2 in the Appendix for a comparison of land prices.

many Sub-Saharan African countries land prices have increased less than elsewhere; hence, many have expectations of a substantial rise in the future. High agricultural prices, such as those prevailing in 2008, coupled with low land prices, may have pushed the global rush for land towards the continent. Buying land in SSA can be considered a very attractive investment. This is particularly true since the 2008-2009 financial crisis: because of low and risky returns on financial assets, land has been considered as an alternative way to invest capital. This has fostered speculative investments and commodification of land. Several Sub-Saharan African countries, moreover, are attempting to take the opportunity represented by the rising trend of land and water value and have tried to attract FDI in land. The underlying idea is to promote economic development and reduce poverty by exchanging abundant resources (land) with scarce ones (capital, infrastructures, skills, technology).

In summary, there are many reasons to invest in land and many land investments are targeted in Sub Saharan Africa on the ground that the sub-continent has land, water and large unexploited agricultural potential (see for all Deininger, 2011)[15]. Forces at stake are not mutually exclusive and often interconnected. In the following section, we deepen the analysis of push and pull factors of international land deals by using econometric tools. In order to tailor the choice of regressors, we focus on a specific type of land investment, namely on international land acquisitions which are concluded for cultivating biofuel crops. The analysis of biofuel-related land acquisitions offer an interesting exemplification of the close nexus between land and energy in a era characterized by increasing pressure on water and land resources for alternative uses (food, commodity and energy production). Moreover, a clearer understanding of this link for Sub-Saharan Africa is particularly relevant since, in the continent, the scale of this type of investment is considerable, and so are also its potential effects. The continent, in fact, faces a persistent crisis in access to food, energy and water and, despite a large availability of natural resources, is energy poor. The assessment of the economic, social and environmental impact of this process is beyond the scope of this paper but the analysis of its drivers can help understanding in what direction the current prevailing trends of FDI in land for biofuel crops are proceeding.

15. It is estimated that 200 million of uncultivated land (out of 445 available across the world) are in Sub-Saharan Africa and that between 1961 and 2007 around 1.8 million ha were open to agricultural production every year in the continent.

3. Drivers of FDI in Land for Biofuel Crops

This section estimates the drivers of investments in land for biofuels using an econometric model and an unexploited dataset. More precisely, we estimate determinants of the number of international large scale land deals that have been concluded in each Sub-Saharan Africa's country from any other country in the world since 2001 with the purpose to cultivate crops that can be used as biofuel feedstocks. We adapt the analysis of land FDI flows to the gravity model framework following a specification similar to that applied by Arezki *et al.* (2011) that have estimated the drivers of large scale international land acquisitions at global level. Unlike Arezki *et al.* (2011), however, we use a zero-inflated count model (ZIP) in order to account for the high proportion of zero in our dataset, we adjust the choice of the variables to our focus on land deals for biofuel crops in Sub-Saharan Africa and we use Land Matrix data rather than only information from press articles reported by the NGO GRAIN.

3.1. The Econometric Model and the Data

The basic idea of zero-inflated Poisson method, proposed in the Lambert (1992) seminal work, is to mix a distribution degenerate at zero with a Poisson distribution. In short, the estimation process of the ZIP model is made up of two stages (Burger et al. 2009) and can be interpreted as a mixture model: in the first stage a logit regression estimates the probability that land FDI for biofuel projects are not affordable or profitable. The second stage estimates the potential count of land investments for the pairs of countries with a non-zero probability of concluding an international land deal. More formally, the analytical framework of this work is built by adapting the econometric model in Campolieti (2002) to a context with bilateral flows. Let *i* and *j* denote investor and destination countries, respectively. In a zero-inflated Poisson model, $N_{i,j}$ the number of land investment for biofuel crops in country *j* from country *i*, can be written as follows:

$$N_{i,j} = 0 \text{ , with probability } \phi_i$$
$$N_{i,j} \sim P\left[y_{i,j}\right] \text{ , with probability } 1 - \phi_i$$

[1] Where

$$P\left[N_{i,j}\right] = \exp\left(-\lambda_{i,j}\right) \lambda_{i,j}^{N_{i,j}} / \lambda_{i,j}!$$

$$\lambda_{i,j} = \alpha + \beta x'_{i,j} + \gamma_j + \eta_i$$

$$\phi_i = \frac{\exp(z'_i\delta)}{1 + \exp(z'_i\delta)}$$

$P[N_{i,j}]$ is a Poisson distribution, $\lambda_{i,j}$ is a linear function of explanatory variables for the number of deals where $x'_{i,j}$ is a vector of bilateral variables, γ_j represents destination-specific pull factors and η_i includes characteristics that are specific to origin country. The function ϕ_i indicates a mixture probability weight and it is the probability that country *i* is not interested in acquiring land areas for biofuel crops in other countries. This probability is modeled as a logistic function which depends on a vector of covariates z'_i and a vector of parameters δ. Conversely, $1 - \phi_i$ is the probability that an investor country is involved international land deals. This part of the mixture model is parameterized as a Poisson count model. Parameter estimates are obtained by maximizing, with respect to $(\alpha, \beta, \gamma, \delta, \eta)$, the log-likelihood function for the zero-inflated Poisson which is specified as: $L(N_{i,j}|\alpha, \beta, \gamma, \delta, \eta) = \sum_{i \epsilon S} ln[\phi_i + (1 - \phi_i)\exp(\lambda_{i,j})] + \sum_{i \notin S}[\ln(1 - \phi_i) - \lambda_{i,j} + N_{i,j} ln(\lambda_{i,j}) - ln(N_{i,j}!)]$ where S is the set of zero-value observations.

Our model is specified as a function of land scarcity, presence of biofuel productive activities in potential investor countries and three regional dummies (high income OECD, emerging and Arab Gulf countries) which group countries of origin that are more likely to be endowed with financial, organizational and technical capacity to undertake transnational investments in advanced sectors such as biofuel production. Land scarcity is a dummy variable that takes value 1 if the country of origin belongs to the top quintile of all countries in terms of agricultural land as a share of total land. We assume that a very high agricultural land share denotes that the country has a narrow margin for expanding its agriculture frontier and is therefore more likely to invest abroad.

With respects to covariates of the Poisson regression component, the estimated model includes bilateral variables that represent geo-political proximity between origin and targeted countries and some proxies for their size, in line with the gravity approach. A set of variables that account for institutional factors in destination countries are also considered to capture the influence of institutional quality on FDI. Moreover, we add potential push and pull forces which may be particularly relevant for geographical distribution of international land investments.

The dataset used combines various data sources. The number of large scale land deals, our dependent variable, is elaborated from the *Land Matrix* database extracting land transactions concluded since 2001 and intended for cultivating crops to be used as biofuel feedstocks (accessed in April 2012). Geo-political proximity is measured by past colonial ties and geographical mean distance between the main cities of origin and targeted countries. These variables come from the GeoDist dataset of CEPII (Mayer and Zignago, 2011). The size of partner countries is represented by variables which are likely to mirror relative factor endowments of agricultural assets in host countries and demand for agriculture goods in origin countries. More precisely, in order to assess the role of land supply capacity, our specification includes total renewable internal freshwater resources and total agricultural land (World Development Indicators – WDI) or, alternatively, the amount of non forest land area that in the Global Agro-ecological Zone 2000 dataset of the International Institute for Applied Systems Analysis (IIASA) is classified as potentially very suitable or suitable for rain-fed cultivation by using maximizing technology[16]. The expected sign of these variables is positive. We also include rural population density, but we have no priors about the sign of this variable as it could proxy a large stock of agricultural land (positive effect) but also a strong demographic pressure on land, which might negatively influence land quality and availability. Furthermore, we expect the degree of dependence on imports of agricultural products and the size effect of potential demand for agricultural goods to be positive country-of-origin determinants of land FDI. These factors are considered by using FAO and WDI standard variables, namely population size and per capital imports of agricultural products in origin countries. Variables on institutional quality draw from three main databases. First, we use the strength of investor protection index elaborated by the *Doing Business* database[17]. The index ranges from 0 to 10, with low values indicating weaker protection of investors' rights which might be less conducive to a favorable investment climate. Second, variables on national governance (control of corruption, rule of law, political stability, and government effectiveness) are based on

16. Technical details available at http://www.iiasa.ac.at/Research/LUC/GAEZ/index.htm

17. Investor protection index from Doing Business refer to 2011, but SSA countries included in the analysis have not experienced changes in this indicator since 2008 (Mozambique) or since the first year (2006) in which this indicator has been available (the remaining countries).

World Governance Indicators (WGI) and indicate the percentile of the distribution reported in the WGI rankings[18].

The role of land governance is assessed by considering different aspects of land tenure systems in the destination countries: importance of public property, security of land tenure rights[19] and presence of public land tenure policies for formalization and/or registration of land rights. The indicators for these dimensions are obtained from the *Institutional Profiles Database 2009*, elaborated by French Ministry for the Economy, Industry and Employment (MINEIE), the French Development Agency (AFD) and the Maastricht Graduate School of Governance (MGSOG). Our expectation on the sign of general institutional indicators is undetermined. Several empirical studies on FDI suggest that firms are more likely to invest in countries with better market and government institutions (Wei, 2000; Bénassy-Quéré *et al.*, 2007, Alfaro *et al.*, 2008, Bissoon 2012; Buchanan *et al.*, 2012). However, part of the literature also finds that FDI, especially Chinese outward FDI and other South-South FDI engaged in resource-based sectors, might be indifferent to or even positively influenced by institutional weakness and political risks of targeted countries (for a review of this literature see Quer *et al.*, 2012): MNEs from emerging and developing countries might have comparative advantages compared to developed-country counterparts in dealing with difficult institutional conditions (Cuervo-Cazurra and Genc, 2008), while poor institutional quality might facilitate rent and resource-seeking strategies. This relation also emerged in the specific case of land FDI. Indeed, Arezki *et al.* (2011) find that, at global level, the number of large scale farmland acquisitions is not significantly affected by the degree of investor protection, but it is higher for lower levels of political stability, control of corruption and, to a greater extent, for lower levels of land tenure security. Furthermore, qualitative and descriptive information collected by Alden Wily (2011) confirms that commons, a vast portion of whom are vested in the state, are

18. Data from WDI, WGI and FAO (namely rural population density, freshwater resources, agricultural land, per capita agricultural imports, general governance indicators, land scarcity) refer to 2007 since, according to available information, the vast majority of all land deals were arranged after that year (Anseeuw *et al.*, 2012b).

19. The index of security land is constructed by aggregating different indices which represent respectively the proportion of the population with no formally recognized land rights, the percentage of land disputes to the total number of disputes handled by the courts, and the importance of land issues on the political agenda and in the press (Crombrugghe *et al.*, 2009).

particularly vulnerable to commercial pressure on lands: these areas are often perceived as unutilized land available for investors, can offer large tracts of uncultivated land which are well-suited for large scale investments, and do not require negotiations with local populations. In light of this evidence, we expect that weak land governance and high relevance of state/public land increase attractiveness of a country for large scale land investment in the biofuel sector.

3.2. Key Descriptive Statistics and Estimation Results

Key descriptive statistics of origin-country variables used in the logit component of the mixture model and of destination-variables employed in the Poisson component are reported in Tables 1a and 1b. The share of OECD, emerging, biofuel producer and land-poor countries is higher among the group of countries that in the period under study have undertaken at least one large scale overseas land acquisition for cultivating biofuel crops than in the rest of the sample. Variables referring to Sub-Saharan African countries, which represent potential target countries, are disaggregated according the presence or absence of at least one project. Data in Table 1B show that SSA countries that have received at least one FDI in land for biofuel crops tend to have higher endowments of freshwater resources and of land suitable for cultivation, and worse land governance indicators than the other SSA countries. The divide between these two groups of countries in terms of overall institutional quality is less clear since standard errors of the indicators used for this dimension are very high.

Table 1.a - Key Descriptive Statistics: Origin country Variables in the Logit Regression Component

	Countries undertaking at least one FDI in land for biofuel crops in SSA	*Other countries*	*t-stat*	*(a)*
High income OECD countries	0.43	0.07	5.6312	***
Emerging countries	0.15	0.01	4.0995	***
Gulf countries	0.03	0.04	-0.389	
Land scarcity	0.43	0.45	-0.3149	
Biofuel producer	0.05	0	2.8782	***
Number of observations	*40*	*159*		

Table 1.b - Key Descriptive Statistics: SSA-Country Variables in the Poisson Regression Component

Variables	*SSA countries receiving at least one FDI in land for biofuel crops*		*Other SSA countries*	
	mean	Std. Dev.	mean	Std. Dev.
Agricultural land (1000 ha)	32600	31000	31000	30500
Freshwater resources (billion cubic meters)	140	202	39	61
Potentially non forest land suitable for cultivation (1000 ha)	31607	28171	11324	13789
Rural population density	309	137	250	231
Investor protection index (0-10)	4.4	1.0	4.8	1.8
Security of land rights (1-4)	1.9	0.4	2.3	0.7
Importance rural public property land (1-4)	2.5	0.9	2.2	0.8
Land tenure policy (1-4)	2.2	0.6	2.7	0.7
Rule of Law Rank	26.2	18.5	37.4	26.5
Government Effectiveness Rank	26.4	15.1	36.0	30.4
Political Stability Rank	28.4	19.9	44.7	29.0
Control of Corruption Rank	27.4	18.0	38.7	27.8
Number of observations	*20*		*10*	

Note: Unweighted averages of country characteristics. (a) Significance of t-test for equality of means. Biofuel crops include Jatropha, Oil Palm, Sugar Cane, Soya Beans, Croton, Oil Seeds, Castor Oil Plant, Sorghum. The category of emerging countries includes China, India, Brazil, Malaysia, Singapore, South Africa, and Russia. Freshwater resources represent total renewable internal freshwater resources in billion cubic meters.

Source: Authors' elaborations from African Development Indicators (2012), Doing Businesses (2012), Global Agro-ecological Zone 2000, Institutional Profiles Database 2009, Land Matrix database (April 2012), OECD iLibrary (2012) and World Development Indicators (2012).

This overall picture about the link between country-specific features and the propensity to invest in SSA land for biofuel projects is largely confirmed by our econometric estimates. Table 2 reports the log-likelihood statistic and regression estimates of the ZIP model for the number of large scale international land deals for biofuel crops in Sub-Saharan African countries. The estimates from the logit regression component[20] of the

20. It is worth clarifying that a negative coefficient indicates a lower probability to encounter zero-values, namely the independent variables with negative coefficient estimates are associated with an increase in the probability of biofuel land deals.

mixture model suggest that the Global North and new emerging countries (China, India, Brazil, Malaysia, Singapore, South Africa, and Russia) are the most involved in the "rush" for Africa's farmland to produce biofuels crops. The coefficient of the dummy for Gulf States, instead, is not significant suggesting that these arid and oil-rich countries are not seeking alternative ways to produce energy but are at the forefront of the so-called "land grabbing" possibly to reduce the exposure of their food supply to market vagaries (von Braun and Meinzen-Dick, 2009). Once the region of origin is accounted for, econometric estimates also show that land-scarce and biofuel producer countries are significantly and highly interested in acquiring overseas lands for biofuel projects. This is consistent with the fact that the bulk of investment in the biofuel production in Sub-Saharan Africa might be export-oriented and that biofuel producers can see transnational land investments as a possible strategy to integrate and expand their access to biofuel feedstocks for domestic energy production. Therefore, under the current pattern, this sector may provide a limited contribution to meet the growing and largely unfulfilled energy needs of the continent.

The estimates of the Poisson model complement and integrate this evidence. In line with conventional gravity models, distance between partner countries negatively influences the number of land FDI for biofuel crops, but, interestingly, the dummy for past colonial relationships, in most cases, in not significant. This might be due to the emergence of new countries as important players in the biofuel market in addition to traditional big investors from advanced economies.

Proxies for supply and demand forces have the expected signs. As for demand, the coefficient of population and per capita agricultural imports are positive and highly significant. This suggest that most populous countries which are quite dependent on agricultural imports are more likely to acquire large tracts of farmland abroad in order to overcome the limits of their biocapacity potential. On the supply side, actual or "perceived" agricultural biocapacity of Sub-Saharan African countries appears to act as a pull force. Countries with large amount of water resources and exploited or potential agricultural land are more likely to attract investments. Coefficients of the total agricultural land and of potential land suitable for rain-fed cultivation are both positive and highly significant. Interestingly, we also find signs that water abundance is another driver of biofuel land demand: the coefficient of freshwater renewable resources is positive and statistically significant. This result is consistent with earlier evidences suggesting that foreign investors, when acquire land, also seek access to

water resources (Anseeuw *et al.*, 2012a)[21].

Our estimates point out also that institutional conditions in host countries matter. Better institutional quality is associated to a higher number of biofuel land deals and this result is robust to the type of governance indicator (effectiveness, rule of law, political stability, control of corruption). However, it is worth noting that value of the coefficients is also quite low. At the same time, the results on protection of investors' rights are not conclusive, since the coefficient of the related index is positive and significant in three regressions out of five. These results differ from Arezki *et al.* (2011), who find a negative and hardly significant effect of conventional governance variables, possibly because of our sectorial and geographical focus. Compared to traditional agriculture investments, investors might pay more attention to the general institutional conditions when they invest in a new sector – such as biofuel production in areas with unfamiliar agro-ecological conditions – that presents significant uncertainty regarding yields, operational costs, processing difficulties and payback periods. Furthermore, Sub-Saharan African countries are often characterized by poor institutional environments in the worldwide rankings, while attracting a disproportionally large share of global large-scale land deals. The negative relationship between standard governance indicators and agricultural land FDI in Arezki *et al.* (2011), therefore, might be due to the relatively high attractiveness of Africa in the global rush for farmland. Our results, instead, suggest that when investors choose to invest in the continent, they slightly prefer countries with better governance conditions.

In line with Arezki *et al.* (2011), we find that countries with weaker protection of land rights are more likely to host a greater number of land FDI for biofuel crops. Both coefficients of index for land rights security and for land tenure policy are positive and the result on security of land rights is also robust to minor changes in model specification. Finally, we find support for the hypothesis that African countries where rural public property is prominent are more targeted by biofuel-related land acquisitions. In these cases, governments might be entitled to dispose and eventually reallocate to external investors large tracts of rural areas, even if used by local communities, since they have lawful authority over them (Alden Wily, 2011). These latest results on the role of land governance is

21. Interpretation of the coefficient for rural population density is more difficult for the above-mentioned reasons, but its positive and significant sign warns about the possible frictions that can arise from a higher concentration of biofuel land deals in rural areas that are densely populated.

particularly worrisome since it might indirectly indicate that attempts of investors countries to expand their access to water and land resources for biofuel production tend to occur in institutional contexts with weak protection of informal and *de facto* rights holders. Under these conditions, therefore, the unbalance of bargaining forces between big foreign investors and local dwellers enhance and is more likely to play to the detriment of local interests.

Table 2 - Zero-Inflated Poisson Estimates for the Number of Large Scale Land Deals in Sub-Saharan African Countries for Crops that Can Be Used as Biofuel Feedstocks

	A	B	C	D	E	F	G
Poisson Regression							
Bilateral variables							
Colonial relationship	0.547*	0.493	0.584*	0.431	0.410	0.529*	0.641**
	(0.314)	(0.343)	(0.323)	(0.313)	(0.343)	(0.306)	(0.299)
Distance	-0.514*	-0.439	-0.432*	-0.601**	-0.573**	-0.454**	-0.521**
	(0.262)	(0.290)	(0.231)	(0.245)	(0.235)	(0.223)	(0.227)
Origin country variables							
Population	0.298**	0.269*	0.281**	0.315**	0.287**	0.279*	0.315**
	(0.143)	(0.147)	(0.140)	(0.143)	(0.141)	(0.144)	(0.134)
Per capita agriculture imports	0.383***	0.341**	0.370***	0.415***	0.381***	0.356**	0.403***
	(0.141)	(0.140)	(0.133)	(0.150)	(0.143)	(0.141)	(0.131)
Target country variables							
Agricultural land (ha)	0.428**	0.414**	0.268*				
	(0.187)	(0.168)	(0.149)				
Freshwater resources	0.288***	0.178*	0.315***				
	(0.103)	(0.0991)	(0.111)				
Potentially non forest land suitable for cultivation				0.440***	0.346***	0.448**	0.403**
				(0.139)	(0.127)	(0.198)	(0.172)
Rural population density	0.653**	0.897***		1.273***	1.561***		0.846***
	(0.306)	(0.316)		(0.305)	(0.367)		(0.286)

Follows Table 2 - Zero-Inflated Poisson Estimates for the Number of Large Scale Land Deals in Sub-Saharan African Countries for Crops that Can Be Used as Biofuel Feedstocks

	A	**B**	**C**	**D**	**E**	**F**	**G**
Investor protection index	0.0750	0.241*		0.355**	0.265**		0.176
	(0.167)	(0.142)		(0.151)	(0.135)		(0.163)
Security of land rights	-0.729**		-0.702**	-0.613**			-0.663*
	(0.319)		(0.342)	(0.298)			(0.343)
Importance rural public property land			0.416*			0.655***	0.450*
			(0.238)			(0.240)	(0.242)
Land tenure policy, formalisation etc.		-0.467***			-0.426*		
		(0.181)			(0.243)		
Rule of Law		0.0273***		0.0178**			
		(0.00870)		(0.00728)			
Government Effectiveness	0.0424***		0.0542***			0.0508***	0.0436***
	(0.00993)		(0.00884)			(0.0133)	(0.0103)
Political Stability					0.0149*		
					(0.00815)		
Control of Corruption						0.00953	
						(0.00955)	
Constant	-13.52***	-14.87***	-8.807***	-13.03***	-13.12***	-9.224***	-12.20***
	(4.571)	(4.295)	(3.198)	(3.233)	(3.173)	(2.788)	(3.256)

Follows Table 2 - Zero-Inflated Poisson Estimates for the Number of Large Scale Land Deals in Sub-Saharan African Countries for Crops that Can Be Used as Biofuel Feedstocks

	A	B	C	D	E	F	G
MIXTURE PROBABILITY							
High income OECD countries	-1.686**	-1.717**	-1.691**	-1.652**	-1.692**	-1.728**	-1.663**
	(0.677)	(0.669)	(0.686)	(0.686)	(0.661)	(0.690)	(0.678)
Emerging countries	-2.646***	-2.662***	-2.663***	-2.637***	-2.668***	-2.676***	-2.633***
	(0.651)	(0.651)	(0.654)	(0.651)	(0.638)	(0.652)	(0.650)
Gulf countries	-0.501	-0.568	-0.539	-0.453	-0.518	-0.584	-0.468
	(1.160)	(1.159)	(1.162)	(1.152)	(1.148)	(1.160)	(1.160)
Land scarcity	-1.733***	-1.731***	-1.726***	-1.719***	-1.712***	-1.719***	-1.732***
	(0.502)	(0.499)	(0.501)	(0.501)	(0.499)	(0.497)	(0.505)
Biofuel producer	-19.92***	-39.08***	-19.09***	-13.63	-19.40***	-28.41***	-19.09***
	(1.971)	(0.882)	(2.284)	(206.3)	(2.686)	(1.064)	(1.800)
Constant	5.460***	5.665***	5.517***	5.458***	5.630***	5.677***	5.332***
	(0.795)	(0.814)	(0.806)	(0.764)	(0.757)	(0.787)	(0.769)
Observations	4622	4622	4622	4468	4468	4468	4468
Log lik.	-227.3	-233.3	-227.1	-230.6	-234.1	-228.8	-223.2

Notes: Variables in logs. Robust standard errors. * p< 0.10, ** p < 0.05, *** p < 0.01. The dependent variable includes all large scale agricultural FDI for cultivation of Jatropha, Oil Palm, Sugar Cane, Soya Beans, Croton, Oil Seeds, Castor Oil Plant, Sorghum. Land deals for multiple crops are excluded. Land scarcity is a dummy variable that takes value 1 if the country belongs to the top quintile of all countries in terms of agricultural land as a share of total land. A low value of investor protection index reflects weak protection of investors' rights. Data on agriculture imports draw from FAOSTATA and are expressed in 1000 $. High income OECD countries, Emerging countries and Gulf States are regional dummies. The category of emerging countries includes China, India, Brazil,

Malaysia, Singapore, South Africa, and Russia. The dummy for biofuel producers is based on the International Energy Agency data on production of biodiesel and other liquid biofuels which are available from OECD iLibrary. The number of land deals is elaborated from the Land Matrix database. Land governance variables (Security of land rights, Importance of rural public property land, Index of land tenure policy) range from1 to 4 and are obtained from Institutional Profiles Database 2009. Non Forest Land Suitable represents potentially extent of non-forest land (1000 ha) very suitable or suitable for rain-fed cultivation by using maximizing technology. These data come from Global Agro-ecological Zone 2000. The other data are drawn from African Development Indicators and World Development Indicators and refer to 2007. Freshwater resources represent total renewable internal freshwater resources in billion cubic meters.

4. Concluding Remarks

Before the 2008 crisis, FDI to Sub-Saharan Africa experienced a period of protracted and sustained growth and in 2011 FDI inflows recovered the peak level of 2008. This overall positive trend may open new prospects for economic growth and development of the continent. Empirical and theoretical literature, however, suggest that the positive impact of FDI does not come automatically and the actual effects are likely to be very heterogeneous. If foreign investment fails to create jobs, to enhance competitiveness in the domestic economy, to bring business opportunities to domestic firms, it will contribute very little to development (UNIDO, 2011). Based on earlier evidence, we argue that the impact is also sector-specific and we focus our analysis on foreign investment in land, a type of FDI which is highly debated and also particularly relevant for SSA countries. In particular, we discuss the drivers of international land investments for biofuel projects in Sub-Saharan Africa. In theory, investment in land could be positive for receiving countries, if rules were followed, technology was transferred and employment created. Moreover, renewable energy sources, such as biofuel, can have an important role in reducing energy poverty and helping Africa to meet its future energy needs. However, given the current governance structure, it is likely that the risks overrun the benefits. We assess these concerns by analyzing the factors driving large scale transnational land deals for biofuel crops in Sub-Saharan African countries. Based on the new Land Matrix dataset, our econometric analysis suggests that biofuel-oriented land FDI tend to prefer African countries with higher absolute agricultural biocapacity, weaker protection of land rights and a stronger role of public property of rural lands. This indirectly indicates that this type of FDI is mainly resource-seeking and might see land governance weaknesses as a way to access land and water resources at very favorable conditions.

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Appendix:

Table A1 - Purposes of Land Deals (number of land deals) and water stress, by Country

	All sectors	*Agriculture*	*Forestry*	*Industry*	*Livestock*	*Mining*	*Tourism*	*Biofuel crops*	*Other food crops*	*Other non food crops*	*Crops for multiple uses*	*% of TARWR withdrawn**
Angola	4	3	.	.	.	.	.	1	1	0	0	0.01
Benin	9	8	.	.	.	.	.	4	3	0	0	0.01
Burkina Faso	1	1	.	.	.	.	.	1	0	0	0	
Cameroon	17	15	.	.	.	.	.	9	6	0	1	
Congo, Dem. Rep.	10	6	.	.	.	.	.	3	1	2	0	
Congo, Rep	2	2	.	.	.	.	.	1	0	1	0	
Cote d'Ivoire	5	5	.	.	.	.	.	2	0	2	1	
Ethiopia	83	77	.	.	.	.	.	31	10	6	7	0.08
Ghana	9	8	1	.	.	.	.	6	1	1	1	0.03
Kenya	13	11	.	.	.	1	.	7	5	0	0	
Liberia	6	6	.	.	.	.	.	3	2	0	0	
Madagascar	39	34	3	1	.	1	.	28	6	1	0	0.08
Malawi	7	6	.	.	.	.	.	1	0	0	0	
Mali	27	24	.	.	.	.	.	10	8	0	1	0.11
Mozambique	92	51	10	.	25	3	2	28	18	5	2	0.01
Niger	3	1	1	.	1	.	.	0	0	0	0	

Follow Table A1 - Purposes of Land Deals (number of land deals) and water stress, by Country

	All sectors	*Agriculture*	*Forestry*	*Industry*	*Livestock*	*Mining*	*Tourism*	*Biofuel crops*	*Other food crops*	*Other non food crops*	*Crops for multiple uses*	*% of TARWR withdrawn**
Nigeria	*21*	*17*	.	*1*	*1*	.	.	*6*	*7*	*0*	*3*	*0.06*
Rwanda	*1*	*1*	.	.	.	.	.	*1*	*0*	*0*	*0*	
Senegal	*8*	*7*	*1*	.	.	.	.	*3*	*2*	*1*	*0*	*0.1*
Sierra Leone	*11*	*8*	*3*	.	.	.	.	*4*	*3*	*0*	*0*	*0.01*
Somalia	*2*	.	.	.	.	*2*	.	*0*	*0*	*0*	*0*	
South Africa	*3*	*2*	*1*	.	.	.	.	*0*	*2*	*0*	*0*	
Sudan	*18*	*13*	*3*	.	.	.	*1*	*2*	*1*	*3*	*2*	*1*
Swaziland	*2*	*1*	.	.	*1*	.	.	*0*	*1*	*0*	*0*	
Tanzania	*58*	*54*	*1*	.	*1*	.	*2*	*38*	*8*	*2*	*0*	*0.09*
Uganda	*4*	*3*	*1*	.	.	.	.	*1*	*2*	*0*	*0*	*0.01*
Zambia	*9*	*8*	.	.	.	.	.	*6*	*0*	*0*	*2*	*0.03*
Zimbabwe	*2*	*1*	.	.	.	.	.	*1*	*0*	*0*	*0*	
All	*466*	*373*	*25*	*2*	*29*	*7*	*5*	*197*	*87*	*24*	*20*	

Sources: Land Matrix, accessed in April 2012 and Zetland and Möller-Gulland (2012)

Note: Discrepancies between aggregated and disaggregated number of land deals are due differences in data availability. Classification of purpose of land deals is based on the main investor sector. *% of TARWR= % of Total Actual Renewable Water Resources (TARWR) for all uses, FAO data, Aquastat from 2009, from low (0) to high (1).

Table A2 - Value of Land in Selected Countries

Value of land per ha	Countries
Less than US$ 100	Ethiopia, Nepal, Uganda, Vietnam, Sierra Leon, Niger, Mali, Chad, Sudan, Bhutan, Mauritania, Guyana, Egypt, Tanzania, Mozambique
US$ 100-200	Burundi, Malawi, Guinea Bissau, Cambodia, Burkina Faso, Kenya, Nigeria, Madagascar, Somalia, Zambia, Equatorial Guinea, Zambia
US$ 201-300	Haiti, Rwanda, Bangladesh, Gambia, Benin, Ghana, Nicaragua, Central African Republic, Jordan, Liberia
US$ 301-500	Cote d'Ivoire, Togo, Lesotho, DRC, Zimbabwe, Algeria, Guinea, Cape Verde
US$ 501-1000	Angola, Senegal, Congo, Cameroon, Swaziland, Djibouti, Bolivia, Oman
US$ 1001-2000	Chile, Cuba, South Africa, Albania, Latvia, Tunisia, Romania, Lebanon, Dominican republic, Syrian Arab republic, Moldova, Iran
US$ 2001-3000	Namibia, Botswana, Costa Rica, Venezuela
US$ 3001-5000	Mauritius, Reunion, Uruguay
US$ 5001-10000	Portugal, Israel, Korea, Greece, Argentina, Malta, Cyprus, Gabon, UAE
US$ 10001-15000	Canada, Australia
US$ 15001-20000	Belgium, UK, Spain Norway
US$ 20001- 30000	Germany, Sweden, France, Italy, Austria, USA, Finland, Netherlands
Greater than US$ 30000	Denmark, Luxemburg, Japan

Source: Authors' elaboration on http://www.fao.org/docrep/003/x8423e/x8423e10.htm#P1851 and http://news.mongabay.com/bioenergy/2006/09/land-prices-in-africa.html. Note that some data refers to the end of 1990s.