

Strategic Acquisition of Agricultural Lands in Sub-Saharan Africa: Determinants of Country Targeting Behavior

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Introduction and Problem Statement

In recent years, the confluence of rising prices of energy and global food prices has led policy makers in emerging and developed countries to explore alternative strategies for energy and food security. Some countries facing pressing energy problems are exploring and investing in bio-fuels to diversify their energy portfolio (Borras and Franco 2010). Bio-fuels offer a less polluting alternative, vis-à-vis fossil fuel-based energy sources. However, bio-fuels production at a large scale is feed-stock and therefore land-intensive. At higher levels of land values, they may become feasible only with some form of subsidy. Similarly, countries stressed by rising global food prices and limited domestic capacity to accommodate rising food demand are seeking to alleviate their land resource constraints.

Energy and food price shocks have led to growing interests in investing in prime farmlands. This is particularly so in Sub-Saharan Africa where over 40 million hectares have been acquired by international investors. Large-scale land deals come in the forms of *leases, concessions or purchases, contract farming and rural and agricultural infrastructure investment*—such as investment in irrigation systems and roads (von Braun and Meinzen-Dick 2009).

This phenomenon, dubbed "land grabbing" by those who question its legitimacy, has raised questions about the nature, consequences and equity implications of long-term land transactions (Oberstorn and Pinstrup-Andersen 2010, Hallam 2009, von Braun and Meinzen-Dick 2009). The choice of the term "land grabbing," as opposed to "strategic investment in land" is driven by the concern that many of the African countries that participate in land deals themselves have serious energy and food insecurities, and by the fact that they may not have the capacity to understand the gravity of these long-term decisions.

The complex decision making process that leads to these international land acquisitions is not well understood. Key to understanding this process is knowledge of the motivations and behaviors by targeting and host countries. This area of inquiry is the main focus of this study.

Study Objectives

- Develop a theoretical model to explain the targeting behavior of investors, the behavior of host countries and the critical factors that determine the probability that a country will be targeted; and
- Implement an empirical model to explain the land acquisition process and the primary determinants of international land acquisitions.

Hypothesized Causal Factors from the Literature

The literature identifies the following reasons for increased interests in African agricultural lands.

- 2007-2008 Global Food Price Hikes:** (Robertson & Pinstrup-Andersen 2010, Aarts 2009, Duangklad 2010, Borras & Franco 2010, GRAIN 2008, Mann & Smaller 2010, FMECD 2009).
- Rising Energy Prices and Derived Demand for Biofuels:** (Robertson & Pinstrup-Andersen 2010, Duangklad 2010, Borras & Franco 2010, Aarts 2009, von Braun & Meinzen-Dick 2009, Mann & Smaller 2010).
- Growing Long-term Commodity Prices Volatility:** (Mann & Smaller 2010).
- Increased Opportunity for Speculative Land Investment:** (Duangklad 2010, Borras & Franco 2010, GRAIN 2008, Mann & Smaller 2010).
- Increased Pressure on Natural Resources in Targeting Countries:** (von Braun & Meinzen-Dick 2009).
- Africa's Favorable Climatic Conditions and Geographic Proximity:** (von Braun & Meinzen-Dick 2009).
- Limited Food Supply and Production Capacity of Investor Countries:** (von Braun & Meinzen-Dick 2009, Robertson & Pinstrup-Andersen 2010, Mann & Smaller 2010).
- Availability of Relatively Abundant and Cheap Land, with Less Water Constraint:** (Robertson and Pinstrup-Andersen 2010, von Braun and Meinzen-Dick 2009, Mann and Smaller 2010).
- Diminishing Development Aid from Donor Countries:** (Cotula et al. 2009).
- Increased Production Costs Differentials:** (von Braun and Meinzen-Dick 2009).

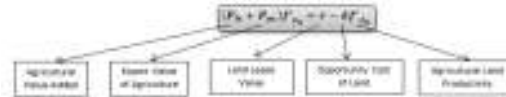
Theoretical Framework and Empirical Model

The Host Country Land Management Problem

The host country maximizes the value of agricultural lands as follows:

$$\text{Max}_{(L_{at})} V = \int_{t=0}^{\infty} e^{-\delta t} [P_{at} \cdot f(L_{at}, x_t, q_t, T_t; \theta_t)] dt + \int_{t=0}^{\infty} e^{-\delta t} [P_{et} \cdot f(L_{at}, x_t, q_t, T_t; \theta_t)] dt + \int_{t=0}^{\infty} e^{-\delta t} [r(t, z) - L_{at}] dt - \int_{t=0}^{\infty} e^{-\delta t} [\delta \cdot f(L_{at}, x_t, q_t, T_t; \theta_t)] dt$$

where V is in-country value of agricultural land, P_{at} is net price for local agricultural products, $f(\cdot)$ is the production function, (L_{at}) is land input, (x_t) is a vector of other agricultural inputs, (q_t) is land quality, (T_t) is technology, (θ_t) is other factors that determine the value of agriculture, (P_{et}) is net export value of agricultural products, (r) is lease value of per unit land at time (t) and location (z) , and (δ) is per unit opportunity cost. The conduction for agricultural land value maximization and land management is:

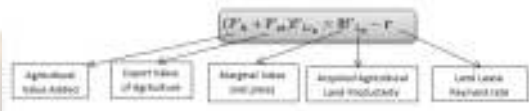


The Targeting Country Land Management Problem

The targeting country maximizes the value of agricultural lands (V') , including foreign investment opportunities, as follows:

$$\text{Max}_{(L_{at})} V' = \int_{t=0}^{\infty} e^{-\delta t} [P'_{at} \cdot f(L'_{at}, x'_t, q'_t, T'_t; \theta'_t)] dt + \int_{t=0}^{\infty} e^{-\delta t} [P'_{et} \cdot f(L'_{at}, x'_t, q'_t, T'_t; \theta'_t)] dt + \int_{t=0}^{\infty} e^{-\delta t} [\theta \cdot f(L_{at}, x_t, q_t, T_t; \theta_t) - r(t, z) \cdot L_{at}] dt$$

where θ is the net value of production from acquired lands, all other variables are as defined previously. The conduction for maximization is:



The two conditions above define the supply and demand behavior. With data on independent variables indicating the determinants of country targeting behavior, we estimate the following logit econometric model:

$$P[T = 1|X] = \frac{1}{1 + \exp(-X\beta)}$$

where $T = 1$ if a country is targeted for land acquisition and $T = 0$ otherwise; X is a vector of determining factors for a country to be targeted, and β is a vector of coefficients. The log-likelihood function is:

$$L(\beta) = -\sum_{i=1}^n (1 - T_i) \ln \beta - \sum_{i=1}^n T_i \ln(1 + \exp(-X_i\beta))$$

The logit econometric model is:

$$\text{P(LANDACQ)}_i = \alpha_0 + \alpha_1 \text{AGLANDPCT}_i + \alpha_2 \text{NETAGTRA}_i + \alpha_3 \text{AGVALUE}_i + \alpha_4 \text{RAIN}_i + \alpha_5 \text{SOILFERT}_i + \alpha_6 \text{PROCAGIM}_i + \alpha_7 \text{PROCAGEX}_i + \alpha_8 \text{TOTAGEX}_i + \alpha_9 \text{GDP}_i + \alpha_{10} \text{PROPRIGHT}_i + \alpha_{11} \text{CORRUPT}_i + \alpha_{12} \text{HUNGER}_i + \alpha_{13} \text{AGCAPITAL}_i + \alpha_{14} \text{GROSSFOOD}_i + \alpha_{15} \text{GROSSFOOD}_i + \alpha_{16} \text{PAVEDW}_i + \alpha_{17} \text{HUMANDEV}_i + \alpha_{18} \text{LANDIRR}_i + \alpha_{19} \text{UNDERNURR}_i + \epsilon_i$$

The dependent variable is whether international land acquisition occurred in country or not; the independent variables are: percent of agricultural land to total land (AGLANDPCT), net agricultural trade (NETAGTRA), agricultural value added (AGVALUE), constrained soil fertility (SOILFERT), processed agricultural import (PROCAGIM), processed agricultural export (PROCAGEX), total agricultural export (TOTAGEX), per capita gross domestic product (GDP), degree of property rights (PROPRIGHT), corruption perception index (CORRUPT), depth of hunger (HUNGER), agricultural capital (AGCAPITAL), gross non-food productivity index (GROSSFOOD), gross food productivity index (GROSSFOOD), paved roads, (PAVEDW), human development index (HUMANDEV), land equipped for irrigation (LANDIRR), and undernourishment (UNDERNURR).

Study Results and Conclusion

Table 1: Logit Model Results for Likelihood of Land Transaction in a Host Country.

Variables	Coefficient	P-val.
Agricultural land (% of total land)	-0.135***	0.002
Net agricultural trade	0.004**	0.042
Agricultural value added	0.1404*	0.068
Rainfall	0.0049*	0.081
Area of severely constrained soil fertility	0.001	0.158
Processed agricultural import	-0.023	0.709
Processed agricultural export	0.060**	0.037
Total agricultural export	-0.036	0.726
GDP per capita	-0.002**	0.022
Property right	0.087***	0.001
Corruption	0.691	0.547
Agricultural capital	0.001***	0.002
Gross food productivity index	0.093	0.149
Gross non-food productivity index	0.047	0.206
Paved ways	-0.0001	0.297
Human development	0.314***	0.011
Land equipped for irrigation	-0.058***	0.008
Undernourished	0.089*	0.068
Constant	-41.002*	0.092
R-squared	0.692	
N	48	

- It is expected that an area such as international land where well funded buyers get to deal with developing country government or local representatives, corruption would be a relevant factor in determining where deals flow. We find that investors are not attracted or detracted from places with high levels of corruption
- Processed agricultural exports attract interest in land investment, but not processed agricultural imports, suggesting export record is relevant.
- Current level of transportation infrastructure in the host country seems unimportant, supporting the notion that investors often are not averse to building necessary infrastructure, such as roads.
- Current level of host country productivity of agriculture and other sectors productivity seem unimportant, suggesting perhaps that potential productivity is what is important to both investors and host country deal makers.
- Investments are attracted to places with adequate rainfall, significant amount of idle lands, prior trading experience, significant value added and market activity, and existing high capital investment, but low irrigation investments, in agriculture.
- Investments are attracted to places with strong property rights, perhaps because investors want to ensure that their ownership rights are protected.
- Investments tend to be attracted to places with low income countries with high degree of undernourishment. This perhaps explain a host country motivation.
- Investments tend to be attracted to places with higher human development index, perhaps suggesting that some investors at least need advanced human capital to make their investments yield production returns.

CONCLUSION: the above suggest that the bulk of the investments are at least tied to the potential for agricultural production, agricultural exports to address food security and markets elsewhere and food security domestically. Results also buttress the need for host country awareness of the motivations of investors.

References

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