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DETERMINING MINIMUM COMPENSATION FOR LOST FARMLAND: A THEORY-BASED IMPACT EVALUATION OF A LAND GRAB IN SIERRA LEONE

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Abstract

The land grabbing issue has produced a plethora of debates ranging from ethical conduct of land grabbing agents, specifically concerning displacement, to evidence for and against positive externalities such as technological spill-overs and construction of infrastructure. An underexplored topic is the valuation of agricultural land and the compensatory payments made to land users, distinct from land owners, for the loss of their source of food security. This paper establishes a theoretical framework for the valuation of agricultural land from the perspective of land users, based on a household production function. For the analysis data were collected in a survey of 203 households in the land grab affected area in the Northern Province of Sierra Leone during 2013. It shows that, for the case of a specific land grab in Sierra Leone, the compensatory payments received by land users are far below the value of the land lost and as such the lease income is unable to allow these households to maintain their previously, already tenuous, levels of food security. A clear distinction is made between land owners and even more vulnerable non-landowning land users who depend on the agricultural land for their food security and livelihoods. The household level analysis showed that in addition to the level of compensation received by the average household being insufficient to maintain a priori welfare levels the distribution of compensation significantly favoured the wealthier households. Since the value of the land and the rent distribution were set in local positive law the project could correctly call itself fully compliant but the land grab still resulted in significant welfare losses. The methodology implemented by this ex-post study can identically be applied to an ex-ante scenario allowing land grabbing agents to define a minimum compensatory payment to land users not based on asymmetrical bargaining power but on actual land value to this vulnerable section of the local population.

Keywords: Land Grabbing; Large Scale Land Leases; Productivity Method; Theory-Based Impact Evaluation; Smallholder Farmers; Customary Land Rights; Welfare Changes; Sierra Leone.

JEL codes: D13 (Household Production), D61 (Allocative Efficiency, Cost-Benefit Analysis), H43 (Project Evaluation; Social Discount Rate), Q12 (micro-analysis of farm firms, farm households, and farm input markets), Q15 (Land Ownership and Tenure, Land Reform, Land Use, Irrigation, Agriculture and Environment), R52 (Land Use and Other Regulations)

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Acronyms

CBA	Cost-Benefit Analysis
CSR	Corporate Social Responsibility
ESHIA	Environmental, Social, and Health Impact Assessment
EU	European Union
FDP	Farmer Development Programme
FFLS	Farmer Field and Life Schools
HH	Household
HPM	Hedonic Pricing Method
MAFFS	Ministry of Agriculture, Forestry and Food Security
NMC	National Maize Corporation
NPV	Net Present Value
PRSP	Poverty Reduction Strategy Paper
SLIEPA	Sierra Leone Investment and Export Promotions Agency
TNI	Transnational Institute
UK	United Kingdom
USA	United States of America

Exchange rates used:

EUR (Euro) 1 = SLL (Sierra Leonean Leone) 5533.2 (average exchange rate for 2013)

USD (US Dollar) 1 = EUR (Euro) 0.783 (average exchange rate for 2013)

1 Introduction

In the wake of the 2007-08 food, financial, and fuel crisis the practice of land grabbing, as well as the attention paid to it by the international community grew considerably (TNI, 2012). The generally accepted definition of land grabbing is the large scale acquisition or leasing of land by domestic and international actors such as governments, multinationals or individuals (Borras et al., 2011, p. 209). It is interesting that the definition of the term, which is popularly interpreted as a negative phenomenon, especially in the context of food-insecure developing countries, does not include any qualifiers pertaining to either compensation or to corporate social responsibility (CSR) activities practiced by the purchasing, or leasing, actor. In other words, the condemnation of large-scale land leases or purchases often occurs without an assessment of the actual impact that the leases, or purchases, have on the local population (Cotula et al., 2009, p. 6).

Whilst the discussion of principles for the ethical execution of large scale land leases or acquisitions has already commenced[1], the question of how to establish a sufficient minimum compensation for affected landowners/land users has not been posed. The distinction between land owning and land using households is an essential one in contexts where land rights are insufficiently defined or where parallel land tenure systems exist. The latter is typical for many developing countries in Sub-Sahara Africa and elsewhere. Under customary law, households without formal land titles are often granted use rights to the land by those families that hold the formal titles to land. Large scale land acquisitions have an impact on both groups, although the more vulnerable segment of households which are land users but not simultaneously land owners are often not formally acknowledged as a stakeholder who is eligible for potential compensation by the land grabbing agent. It is argued in this paper that the minimum payment required for the compensation of smallholder farmers must be based on the net value of the goods that could have been produced on the land had it not been leased or sold. This, naturally, does not include compensation for possible societal damages such as are caused by displacement, and as such should be considered purely as a minimum requirement for the individual compensation of the land user. What this paper will additionally argue is that the minimum compensation requirement is one that can be determined both ex ante, and ex post. The rigorous determination of the case specific minimum compensation amount could buffer potential negative impacts on the population which loses access to land due to a land grab.

The following section provides a broad overview of the major topics surrounding the land grabbing debate. Briefly a definition of what constitutes a land grab is provided. Attention is paid specifically to the debates orbiting smallholder farmers and the effects of the loss of agricultural land due to the leasing, or selling, of their farmland to a company or institution, national or international. It is noted that assessments of land grabbing instances often, while focussing on pertinent issues, omit to quantify the welfare effects, positive or negative, felt by the land grab-affected population. Additionally, the question of how high must rent payments be in order to fully compensate individual households for the lost productive land has not yet been tackled in the literature. Whilst full

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1 See for example De Schutter (2009) for a discussion on guiding principles surrounding both human rights issues as well as issues of food security.

compensation for lost productive land may not be a sufficient condition for supporting land grabbing activities, it is a necessary condition for evaluating the sufficiency of the payments made by the project. Section three outlines the major characteristics of the project in Sierra Leone, specifically those activities that impact, positively or negatively, the project affected people. This is the obvious loss of land, but also the various compensation mechanisms enacted by the project in order to mitigate the economic and food security effects of the loss of agricultural land. The theoretical framework for the analysis of the compensation paid by the project based on a household production function is presented in section four. The research methodology is explained in Section five. Section six presents the results of the production function empirics and derives thereof the minimum payment that shall be made to compensate smallholders for the land lost. Section seven provides some concluding remarks and recommendations.

2 Large Scale Land Leases and Smallholder Farmers

2.1 Drivers of the Current Global Land Grab

There exist slight differences between interpretations of what constitutes a land grab with some authors interpreting it as large scale land acquisitions, as purchases or leases, for the purpose of agricultural production specifically by foreign investors (Cotula et al., 2009; Daniel & Mittal, 2009; GRAIN, 2008). Alternatively Borras and Franco (2010) widen the scope for the definition to include (trans)national commercial land transactions. Whilst this may include leasing and purchases, similar to the definition above, it allows for domestic land investments as well as land investments for non-agricultural purposes to be classified as a land grab also. For the purpose of this study, however, the difference is of little importance since the project is an international large scale land leasing scheme for agricultural production, specifically for biofuel from sugarcane.

The practice of land grabbing has emerged recently as a pertinent issue for both development policy and in public opinion especially since the 2008 crash of the international financial markets[2]. Suffice it to say here that although the practice occurred prior to 2008 the food, financial and fuel crisis has popularised the practice in the search for financial returns, food security (GRAIN, 2008, pp. 2–3), as well as for the establishment of sustainable energy supplies, specifically biofuels (Graham et al., 2011, p. 2).

Particularly relevant to this study is the driving factor of demand for biofuel supported by the EU agro fuels policies. Graham et al. (2011) argue that, for example, the renewable energy targets for EU member states outlined by EU Directive 2009/28EC are encouraging EU member states to enact consumption incentives for products such as biodiesel or bioethanol (in Germany, the UK, and France for example). Following such incentives it is argued that the current rush for large scale land leases may be largely driven by the European demand for biofuels (Cotula et al., 2009). The literature on the drivers of the current rush to acquire land globally is substantial; for more comprehensive discussions of this topic refer to Borras and Franco (2010), Cotula (2012), and TNI (2012).

In addition to the increased demand for biofuels the current global rush for land may also be driven by another dimension of the 2008 market crisis. As McMichael (2012) argues, recent increases in food prices seem to have generated interest in agriculture as a driver for the development process. Whilst large-scale agricultural investments of foreign parties may be a lucrative source of exchange earning and contributor to economic growth, the focus on attracting foreign agricultural investment may jeopardise the food self sufficiency of a country, as Lavers (2012) points out for the case of Ethiopia. Similarly Li (2011) observes that such large scale land lease ventures may be lucrative, but they threaten the livelihoods of the local population whose land is leased, and subsequently are left unemployed and without a source of livelihood placing the local population at substantial risk for the benefit of macroeconomic growth policies. Additionally, the current exclusive prioritization of smallholder farmers, to the exclusion of other modes

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2 For a more extensive discussion of the drivers behind the current global surge or land grabbing please consult Cotula et al. (2009), De Schutter (2011), and TNI (2012)

and scales of agricultural production, has come into question (Collier & Dercon, 2013). Collier and Dercon (2013) argue that the focus on smallholder farmers as primary means for sustainable development and global food security ignores the significant advantages of more large scale agricultural production. These advantages include knowledge and technological advancement, improved access to capital, as well as superior logistical, marketing, and storage infrastructure. However, in their study of various Sub-Saharan countries Kleemann et al. (2013) found scarce evidence for positive spill over effects into other sectors from improved infrastructure or from knowledge and technology transfers, which are an inherent assumption in the argumentation of Collier and Dercon (2013) in favour of large scale foreign investments. Kleemann et al. (2013) conclude that local food prices are likely to rise, as the produced food from instances of land grabbing is, for the most part, destined for export thus reducing local supply whilst at the same time displacing smallholder farmers from their major source of livelihood.

It thus becomes clear that a pervasive status quo regarding whether land grabs have positive or negative effects on the development of local populations, whilst leaning towards the negative, remains rather elusive. It is not the purpose of this paper to provide, in any way, an answer to this question as it is the conviction of the authors that no such answer ubiquitously exists. An answer to the question of what the impact of land grabbing activities is on the local population must be approached in a case by case manner in order to allow for context specific heterogeneity.

2.2   Focussing on Smallholder Farmers

The analysis of the drivers of land grabbing is essential, especially bearing in mind the importance of the drivers when creating policy to address the challenges introduced by the large scale acquisition of agricultural land (Cotula, 2012). Nevertheless these global debates must also be based on careful evaluations of the impacts, negative and positive, of specific instances of large scale land leases and purchases. Oya (2013, pp. 504–505) calls for research concerning the issue of land grabbing, or land deals as he more neutrally phrases it, to be conducted not in terms of reporting global figures but in project assessments in order to "learn about the process and impact of these deals". He goes on to highlight some of the more sensationalist tendencies in the current land grabbing literature in terms of the dichotomies upon which they focus, for instance national vs. domestic, or subsistence vs. market-oriented. As Oya (2013, p. 514) observes, such approaches may conceal ideological biases and prevent a neutral observation as well as a correct evaluation of the effectual impact of a land leasing or purchasing scheme on the project affected population. A similar plea is made by Smalley and Corbera (2012) who found significant differences, in terms of displacement as well as relationship between the purchasing agent and the local population between the two cases analysed in the Tana Delta in Kenya. Smalley and Corbera (2012) call for individual, situation based analyses of the impact of a land grab.

Whilst it is essential to maintain a case specific focus in the evaluation of land grabs it is nevertheless unavoidable to situate each case within the global debate over standards and good practices. Initiatives such as the „UN Guiding Principles on Business and Human

Rights" attempt to shape the behaviour of both states and companies for the benefit of both business and human rights (United Nations Human Rights, 2011, p. 1). Norpoth and Kaltenborn (2014, p. 402) observe that whilst the concept of socially responsible business is not novel the current attempts at establishing concrete guidelines and legislation is typified by a myriad of opaque documents with both doubtful implementability as well as voluntary participation by the actors in question. The mention of this global debate concerning the responsibilities of businesses and states alike is essential in the definition of what should be expected from the actors leasing land. De Schutter (2009) identifies a set of core principles in an attempt to address the most dire human rights challenges faced by most instances of land grabbing. These principles are wide reaching, from the observation of the right to food (p.5), the right of land use of indigenous peoples in particular (p. 7), the rights of agricultural workers and the accountability in the use of revenues (p. 12). These three points are of particular relevance to the purpose of this paper as they address the need for adequate compensation received by the project affected people. It is not the purpose of this paper to contribute to the call for the updated and internationalized conceptualization of the socially responsible global actor (Norpoth & Kaltenborn, 2014, p. 402). However the quantification of the minimum compensatory payment for the loss of land use rights due to land leases could contribute to the analysis of a company's adherence to this principle established by De Schutter (2009, p. 7) and consequently facilitate the future implementation of legally binding legislation.

2.3   Determining the Value of Agricultural Land

Since the reduction of land use rights mentioned above is, by definition, unavoidable in land leases the question at hand is the definition of a minimum compensatory payment required to counteract the negative externalities produced by such a breach. Such a compensatory payment does not, of course, compensate for all the negative effects imposed upon the indigenous population by the land grabbing agent and as such must be viewed not as a just compensation but rather as the minimum compensatory payment for the infringement of one of the breached rights. That is to say, minimum compensatory payments to the indigenous populations for their loss of land use rights are to be viewed as one dimension of the socially responsible business.

The quantification of the appropriate compensatory payment for the breach of the right to the use of land goes back to such founding works of modern economics as Ricardo (1817), Smith (1776), and von Thünen (1842) who, to differing extents, formalized the determinants of the value of land and by extension land rent values. Recent elaborations built on those historic foundations adopt, for the most part, either the Hedonic Pricing Method (HPM) or the Net Present Value (NPV) approach to their investigations into the determinants of agricultural land value (Feichtinger & Salhofer, 2011, p. 1). The HPM requires the presence of a well-functioning agricultural land market in order to analyse differences in land characteristics and associate these to differences in rent and sales prices. Due to the fact that this market does not exist in the area of the case study the focus here will be on the NPV approach instead.

Robison et al. (1985, p. 795) argue the relationship between the value of land, both in terms of rent and purchase prices, is strongly connected to expected future monetary

returns to agricultural land. Consequently the conceptual definition of the NPV of a parcel of land is simple enough: "the current value of a parcel of land is the sum of the expected cash flows discounted according to the risk of these cash flows" (Goodwin, et al. 2003, p. 745). Over the past decades the definition of NPV for agricultural land has expanded significantly as the models were augmented to include a variety of price determining factors. Robison et al., (1985) showed that factors such as the non-agricultural property market may influence the value of agricultural land in addition to the expected monetary returns obtained from agricultural production. Government policy was found to be a significant determinant of agricultural land values as farmers expect the continued support from government subsidies and as such increase their willingness to pay for agricultural land to receive said subsidies (Weersink, et al. 1999). Goodwin et al. (2003) return to one of the central contribution of von Thünen, (1842) and integrate farm specific locational information which are argued to influence the value of agricultural land.

Although the complexity of the theoretical models implemented by the above mentioned studies has been significantly augmented, the central principal that the value of agricultural land is inexorably linked to the expected agricultural produce to be obtained from said land has remained since the times of Smith, Ricardo, and von Thünen. Consequently the value of the land lost by the land users is equal to the monetarised value of the produce that could have been obtained had the land been cultivated by said land users.

2.4   Using Cost-Benefit Analysis to Evaluate Impacts on Project Affected People

Conceptually and theoretically similar approaches to NPV and hedonic pricing methods to evaluating land values have been adopted in assessing project effects in developing countries, particularly with smallholder farmers in mind. Ahmed and Sampath (1992) investigate the effects of technological progress, brought about by irrigation practice changes, in Bangladesh rice production using a market based approach to CBA and conclude that both overall welfare and wealth distribution would be positively influenced by the introduction of new irrigation technologies. Ahmed and Sampath (1992) implement a slightly augmented version of the market equilibrium model developed by Hayami and Herdt (1977); augmented in so far as the Hayami and Herdt model approximates the equilibrium price and quantity after the technological change using the first order term of the Taylor expansion which Ahmed and Sampath (1992) criticise due to the possibility of considerable error in the resulting estimates and as such themselves implement a third order Taylor expansion instead. Additionally the authors augment the previous model to incorporate shifts in the demand as well as the supply, specifically to incorporate population growth as a dynamic shift in the demand function. The analysis concludes that the evaluated irrigation technology would considerably augment welfare, read consumer and producer surplus, and additionally promote distributive justice (Ahmed & Sampath, 1992, p. 156).

Technological progress, or technical efficiency, is a concept often researched in agricultural economics, especially in developing countries where the assumption of large returns to technological progress is commonplace; see for example Kudaligama &

Yanagida, (2000). Dlamini et al., (2012) investigate the technical efficiency within maize production for 203 randomly selected maize producers supplying the National Maize Corporation (NMC) of Swaziland. The study uses a stochastic frontier approach assuming a Cobb-Douglas type production function for the production of maize. Their results suggest that, for the considered case, various variables influence the technical efficiency of maize producers, the most significant of which being off-farm income (Dlamini et al., 2012, p. 5634). The authors explain this connection by arguing that households with off-farm income have larger capital at their disposal enabling them to purchase inputs often not affordable to those households without or with less off-farm income. Noteworthy are their findings pertaining to the link between output, technical efficiency and farm size. Dlamini et al., (2012, p. 5632) found that the variable farm size elasticity of output was statistically insignificant which they attributed to the pervasive practice of intercropping, practiced by the farmers in their sample, which they argue resulted from the fact that increases in farm size were not fully utilized for the production of maize. Similar findings are reported by Cornia (1985) in his study of the links between farm size and yields in fifteen developing countries using an agricultural production function. Cornia (1985), however, suggests that only in very few cases can the insignificant, or even negative, correlation between farm size and yield per area unit be attributed to decreasing returns to scale. Predominantly, Cornia claims, the reason for this observation is the proportionately greater levels of capital investments often observed in smaller sized farms when compared to larger ones. Bagi (1984) conducted a similar study, also implementing a Cobb-Douglas stochastic frontier production function, to investigate whether or not a significant difference in farm level, i.e. household level, technical efficiency existed between full time and part time farms for a sample of 193 farms in West Tennessee, USA. Bagi (1984) found no significant differences between the two subsamples.

Such studies, as mentioned above, are founded on theoretically similar foundations and implement comparable methods; these could be captured under the heading of the production function approach to Cost-Benefit Analysis. Productivity method, derived value method or income method, are additional names that have been used in this particular literature pool. Regardless of the nomenclature, and internal debates within this area, these studies implement a household or agricultural production function based on comparable welfare theoretical foundations, to investigate the effects of changes in various inputs on agrarian output. Interestingly the focus of analysis of these welfare theoretic evaluation methods is diverse; from the welfare impact of irrigation to technological effects and to the value of various environmental amenities. Due to this versatility this paper suggests that the productivity method may be implemented in order to evaluate the minimum compensation for land lost to a land grab. This minimum will be assessed as that payment which, *ceteris paribus*, fully compensates a smallholder for the welfare foregone from leasing out land. The following section will outline the theoretical framework implemented in order to conduct this analysis.

3   The Project: Setting and Structure

The empirical data required for determining the minimum compensation for the loss of farmland due to the land grab have been collected in the project area in Sierra Leone (cf. Section 5 on the research methodology and sampling). For the description of the land grab project and its context in this chapter, this study largely draws from secondary materials such as project reports and promotional materials provided on the web page of the land-lease project and a summary of the Environmental, Social, and Health Impact Assessment (ESHIA) Report published in the internet.

The land grabbing agent, a European energy company, has leased 57,000 hectares (140,850 acres) of farmland for a period of 50 years in order to develop a greenfield integrated agricultural and renewable energy project in Northern Sierra Leone. In 2008, the project was officially launched and became fully operational in early 2014. It aims to produce bio-ethanol from sugarcane for export to the European Union, as well as green electricity from a biomass fuelled plant which will power the ethanol refinery and ultimately sell electricity to the national power grid.

Of the total leased land just over 10,000 hectares (24,700 acres) are used for the cultivation of sugarcane, 1,777 hectares (4,400 acres) for the creation of biodiversity corridors and around 2,000 hectares (5,000 acres) are used for a CSR (Corporate Social Responsibility) programme, aimed at developing agricultural production skills of local farmers and maintaining their food security through the provision of adequate farm inputs. The remaining land leased is currently left fallow by the project which plans to relinquish the unused land back to the land owning families. It is plausible that the relinquished land is likely to be returned into the hands of the land users by the land owners as occurs frequently under customary law. This is explained in greater detail below. The estimated number of affected people living in the project area varies according to different sources, as such the conservative estimate of 13,617 people mentioned in the ESHIA report will be used for the purpose of our research. In the current study the project affected population is defined as those households which are living within the project areas in the Northern Province of Sierra Leone. This does not include potential households living outside the area which may be reaping benefits from job opportunities created by the project.

In May 2014, the project-operating company claimed to employ 2,750 people within its area of operation and produced approximately 85,000m³ of ethanol per annum. The project plans to sell surplus electricity from their biomass electricity plant, which is used to power the sugarcane bioethanol refinery, to the national power grid of Sierra Leone.

One of the most critical discussions orbiting the current global land grab concerns the effects of the displacement of the project affected people. The ESHIA report found that of the 13,617 project affected people, 77 were displaced. Even if displacement is only one type of effect a household may feel when confronted with a land grab, in the context of this study the focus is on those among the more than 13,000 people who lost access to land due to the project and the question whether the compensation paid for the leased land was sufficient to cover lost agricultural output. In this context, it is essential to reiterate that the focus of this study lies on the compensation received, and damage incurred, by the farmers using the land. This distinction of land users, from land owners and local

chieftains, is crucial especially in settings where customary land tenure rules co-exists alongside formal statutory law, as in many developing countries including Sierra Leone.

3.1   Local Land Tenure System

Outside the Western Area, which includes the national capital Freetown, land in Sierra Leone can neither be bought nor sold. The Provinces Land Act of 1927, Cap 122, is the main statutory law governing acquisition of so-called "provincial lands" in Sierra Leone, alongside customary law (SLIEPA 2012, p. 7; The Oakland Institute, 2011, p. 18). Land is vested in the Tribal Authorities, i.e. the Paramount Chiefs and their Chiefdom Councillors, who are regarded as the "custodians of the land" (The Oakland Institute, 2011, p. 18; SLIEPA 2012, p. 4). Indigenous families ("natives") are the de facto owners of the land and hold usufruct rights to it. While provincial lands cannot be sold according to prevailing law, they can be leased to "non-natives," including foreigners, for a maximum of 50 years, with provision for a one-time renewal up to 21 years (SLIEPA 2012, p. 7; MAFFS 2009, Section II).

The project-operating company thus had to navigate a complex land tenure system in the design process of their rent payment mechanism, which will be discussed below. There exist three different local actors in Sierra Leone, between which customary law dictates land ownership and use rights, i.e. the paramount chiefs, the land owners, and the land users. Government authorities are not directly involved in land disputes and land deals, as the Chiefdom Councils Act and the Local Government Act of 1994 (section 28(d)) attribute the land ownership to communities, under jurisdiction of paramount chiefs, with varying forms of tenure. The three actors at the local level have varying, sometimes conflicting, rights and obligations which were contributory to the eventually established rent payment mechanism by the project.

Figure 1 below provides a simplified overview of the land tenure system in Sierra Leone, which in practice is made highly complex due to the simultaneous existence of statutory law, placing land rights into the hands of both land owning families as well as local paramount chiefs, and customary law, which in addition to placing significant power into the hands of paramount chiefs give land use rights to non-landowning households. The figure illustrates the hierarchy of the various stakeholders and the legal foundation upon which they rest. At the apex of the hierarchical structure sits the paramount chief of Sierra Leone's 149 chiefdoms. There exist various classifications of chiefs at different administrative levels; however the paramount chiefs of the concerned chiefdoms are of particular importance in the question of land disputes and tenure, as well as in provincial land acquisition (Unruh & Turray, 2006, p. 2, SlEPA 2010, p. 5). Unruh and Turray (2006) acknowledge that the degree of influence that the paramount chiefs have on the decisions of land issues varies across chiefdoms. However they state that across Sierra Leone no decision is taken as final without the approval of the paramount chief who is viewed as the custodian of the land. This decision making power, imbued upon the paramount chief by both positive and customary law (see figure 1), is reflected in the fact that land lease agreements must be signed by the respective paramount chiefs (SLIEPA 2012, p. 9).
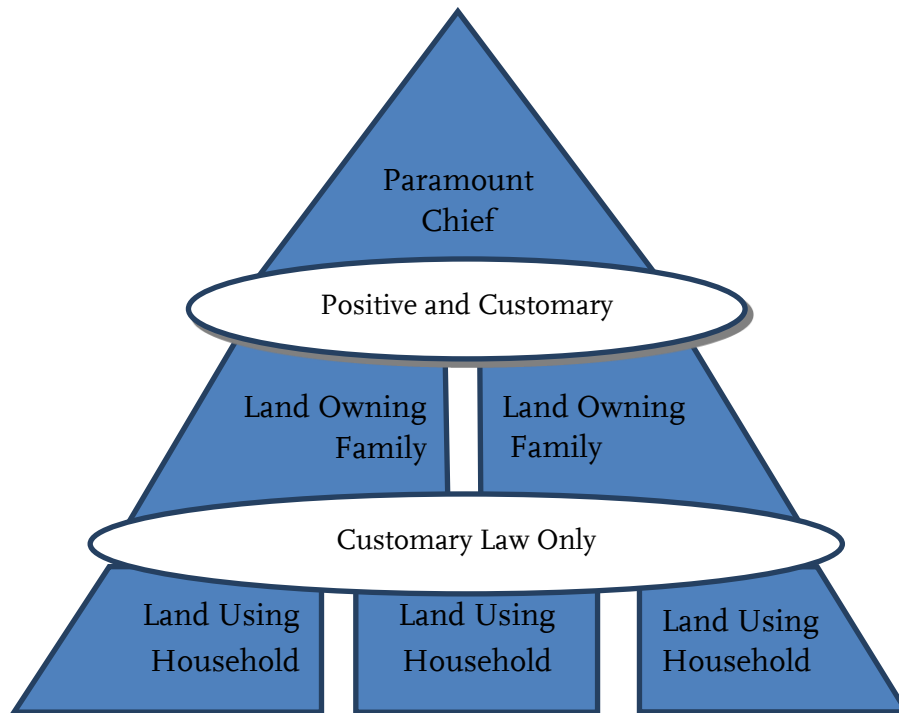
Figure 1: Local Decision Making Structure of Land Issues in Sierra Leone (based on Unruh & Turray, 2006, pp. 2–6)

Ownership of land is bestowed on extended families, not individuals, who can trace their lineage back to the founding ancestors of that particular local clan. Consequently, an extended family is treated as a legal entity with internal leadership taken by the head of the extended family and a council of principal family members, usually elders. This family internal leadership defines the allocation of the family owned land across the various households, which are part of the extended family. Interestingly, it is possible for paramount chiefs to be the decision maker, above the family internal leadership, in intra-family land disputes (Unruh & Turray, 2006, p. 2). As such if a number of households of the same extended land owning family are in conflict with each other the paramount chief may even overrule any decision made by the leadership of said extended family. It is essential to make the distinction between extended family and household at this stage. Whilst a household is the definition for a unit living on the same premises, led by a household head, the extended family may contain numerous geographically dispersed households which interact according to an internally defined hierarchy and are led by the family leadership. Figure 1 above makes a clear distinction between land owning families and land using households; however this distinction is in reality slightly more complex. It is possible for a household, which cultivates a plot of land, to be part of a land owning family even if the head of the land using household is not in the family leadership. Similarly the paramount chief will be the head of his extended family, and his immediate household may actively cultivate a plot of land placing him in all three categories of the above pyramid.

Whilst this land tenure system may seem to place significant power outside the hands of the land owners, the final group, the land users, is the group with the most precarious

situation. Due to a prevalent lack of faith in formal land transaction possibilities most land owners rely exclusively on informal land agreements both within families as well as with other families, a setting that holds for both, land owning families and non-land owning but land using households (Unruh & Turray, 2006, p. 4). Unruh and Turray (2006) argue that a significant advantage in Sierra Leone, compared to other post-war countries, is a concept they call the "inalienability of rural lands". Suffice it to summarise the concept here as a situation where temporary use rights of land owned by landowning families, but not currently used, are awarded to land using households (Unruh & Turray, 2006, p. 5-6). Consequently figure 1 above shows that the interaction between land owning families and land using households is based on customary law where land rights are granted to the land using households. The Sierra Leone civil war (1991-2002) has led to the displacement of non-land owning households which for their food security rely heavily on the customary law that they be granted use rights to agricultural land not currently being used by households of a land owning family. Consequently, whilst land users are relatively free to cultivate unused land not owned by them in search of food security, their situation remains precarious due to the short term nature of the informal contracts which often require parts of the harvest to be transferred to the land owning families. Due to the fact that no formal legal rights are given to these households, only customary law, they form no part of the compensation structure established by the project which only considers compensation for stakeholders with formal legal rights to the land. Since the aim of this paper is to determine the value of the lost agricultural land and compare this to the compensation received, the study is conducted with focus on all land using households; this includes both landowning land using households as well as non-landowning land using households (henceforth land users). As a result the sample includes households which cultivate land in the area and may or may not also be part of a land owning family (henceforth land owners).

3.2 Rent Payment Mechanism

The land tenure system in Sierra Leone shaped the current rent payment mechanism established by the project. In addition to the actors described above the size of the project required government approval even though government bodies are usually not part of locally negotiated land tenure issues in the project area. Consequently, in addition to the chiefdoms and land owners, both district councils and the national government had to formally approve land acquisition and receive compensation for the leased land. Table 1 below shows how the total sum per acre paid by the project (€3.91/acre/year) is divided amongst the various stakeholders.

Table 1:   Division of Rent amongst the Stakeholders

Stakeholder	Land Lease			Land Lease and Acknowledgement Agreement		
	%	€/acre	$/acre	%	€/acre	$/acre
Landowners	50	1.41	1.8	63.97	2.50	3.19
District Council	20	0.56	0.72	14.41	0.56	0.72
Chiefdom Administration	20	0.56	0.72	14.41	0.56	0.72
National Government	10	0.28	0.36	7.21	0.28	0.36
Total	100	2.82	3.60	100	3.91	5.00

Based on: Baxter, 2013, p. 21

The total compensation payment per acre of €3.91 ($5/acre) was paid by the project to various stakeholders through two contracts (the land lease contract and the acknowledgement agreements; Baxter 2013, p. 21). Through the land lease contract the project pays €2.82 per acre per annum which is divided between the various stakeholders as illustrated in Table 1: 50% to landowners, 20% each to the district council and chiefdom administration, and 10% to the national government. This rent distribution is in line with the government's "Investment Policies and Incentives for Private Sector Promotion in Agriculture in Sierra Leone" (MAFFS 2009, Section II, cf. Welthungerhilfe 2012, p. 19) and the Provinces Land Act Cap. 122, which requires any land lease deals to be signed with the local statutory authorities, i.e. the chiefdom councils which are to be compensated for lost land. The principal negotiation partners for the land leases were the paramount chiefs who signed the land lease agreements with the project on behalf of the land owning households. The legal framework in Sierra Leone precludes the signing of lease agreements by the individual land owners. The project partially circumvented this legal framework, and the prescribed distribution of rent payments, by introducing so-called "Acknowledgment Agreements" with the land owners who, in return for acknowledging the rights and obligations of the leasing parties, received an agreed upon sum of money (1.09€/acre) (cf. SLIEPA 2012, p. 27). Initially the payment to the land owners was €1.41 per acre per annum, but in 2011, upon signing of the Acknowledgement Agreements, the sum of €1.09 was added to establish the current payment of €2.5 per acre per annum for the landowners. Thus the Acknowledgement Agreements resulted in a redistribution of the legally specified €3.91/acre in favour of land owning families.

Due to the precarious legal situation of the land users these had no legal claim to the land and as such no official voice in the negotiation process. Figure 2 below summarises the responses from the project affected land-using households to the question regarding who made the decision to lease the land they were formerly cultivating either for their own consumption or commercially. Whilst 36% of the respondents refused to respond and 46% stated the decision was taken by the land owning family, only 12% of the respondents stated their household head decided to lease the land.
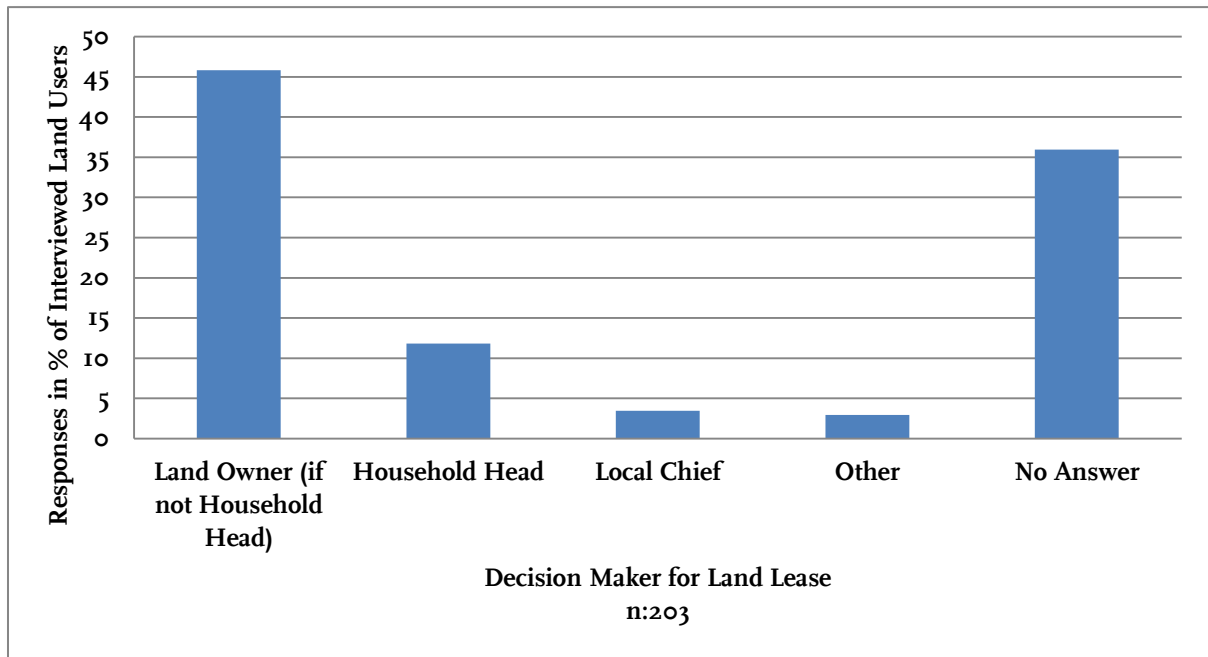
Figure 2: Decision Makers on Land Leasing (2012/2013)

Additionally figure 2 provides information on the division of the sample between land owning and non-land owning land using households. Those respondents which claimed the head of their household made the decision to lease the land are land owning households, whereas those which claimed that the land owner made the decision, and not they themselves, are non-land owning land using households. Those that refused to respond to the question are unlikely to have made the decision themselves and also fall into the non-land owning land using household category. Consequently, almost 90% of the 203 interviewed households are assumed to be non-land owning land using households. This major stakeholder group has no rights to the land they cultivate beyond customary law and as such no formalized, coherent, compensation rights. Any payments to the land users are on a purely voluntary basis from the paramount chiefs or the land owning families. Figure 3 below illustrates how much land each household lost to the project and the compensatory payment received for said lost land.

Recalling that the project was supposed to pay landowning households €2.5 per acre according to the lease contract and acknowledgement agreements, the data points in figure 3 show drastic deviations from the intended per-acre compensation. They can be categorised into three different clusters. First, those falling below the €2.5/acre line which represents non-landowning land using households which received, probably from the landowning families, less than the €2.5 expected compensation by the project. Secondly, those which fall above the €2.5 line but lost some land to the land lease. These households likely received some payments from local chiefs, or are the households of said chiefs. Finally, there is the cluster of households which reported no loss of land but received compensation nonetheless.
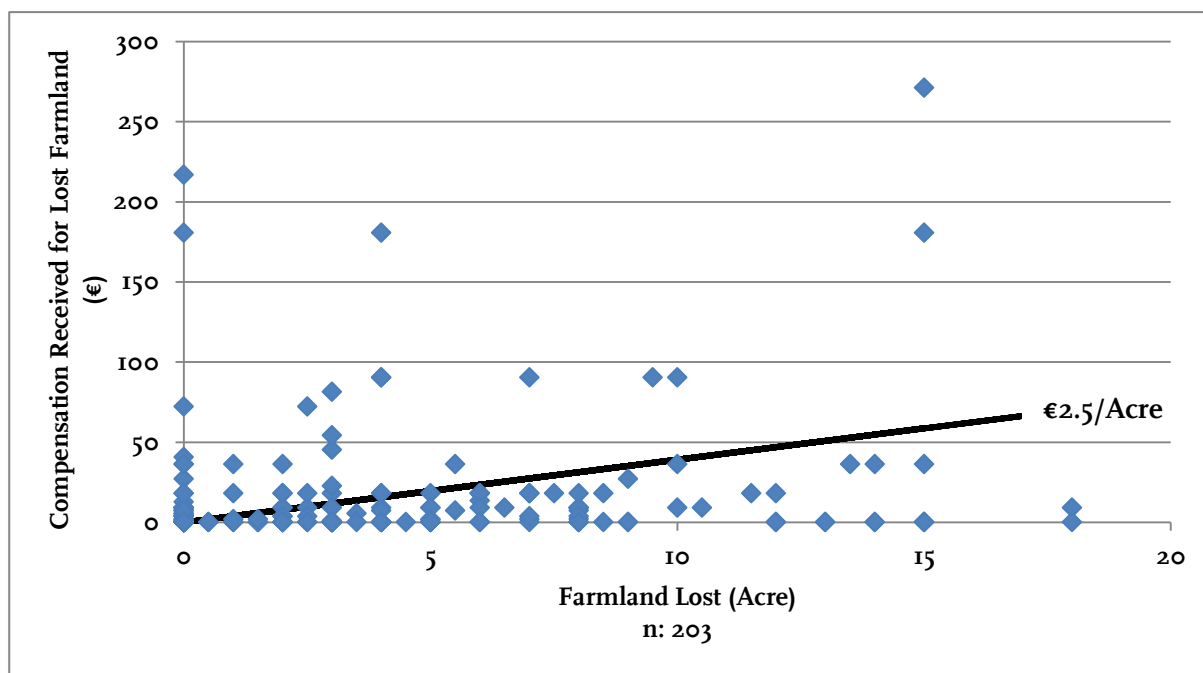
Figure 3: Acres Lost and Compensation Received by Land Users, (2012/2013 Annual)

The coexisting customary and positive legal systems outlined above define the various stakeholders and their rights to compensation when it comes to land leases and attribute no rights to compensation to non-landowning land using households. This characteristic of the complex land tenure system is highlighted by figure 3 which suggests an ambiguous relationship between land lost and compensation received by the land using households. By extension it should therefore be the case that there exists no relationship between the opportunity costs of the loss of agricultural land and the land lease income. If this holds true then it can be concluded that the prevailing distribution practices of compensatory payments as defined by national law are inherently flawed regardless of the sufficiency of the actual rent payment made.

In addition to the land lease and the acknowledgement agreements the project compensated local households for their loss of economically important trees which grew on the leased land. Land using households are dependent upon these trees for the production of various agricultural products such as palm oil and palm kernel oil. Currently, after the loss of parts of their land to the project, the sample's households draw 17% of their farming income from products gained from these palm trees. Acknowledging the importance of these trees for farming households the project paid a lump sum to the people in the project area depending on how many and which trees were lost due to the land lease. For example land owners received €10.34 for each improved oil palm and €4.81/acre of Banana trees. For the sampled households these payments amounted to €8.46/acre (Baxter 2013, p. 40). It is noteworthy that this payment for the losses of economic trees was a one off payment, a lump sum which will not be repeated. On average the sampled households claimed to have received €3.82/acre from land lease payments. The fact that this is larger than the prescribed €2.5/acre could indicate that some confusion existed amongst the farmers as to whether the received money was for the land lease or for the loss of economic trees.

3.3 Risk Mitigation: Corporate Social Responsibility

Due to the fact that the project acknowledged the difficult land tenure system and the economic importance of land especially for the non-land owning households the project established a CSR programme to maintain food security among the affected households, apart from the lease paid to the national government, the chiefdom and district councils, and to the land owners. The primary objective of this CSR programme, the Farmer Development Programme (FDP), is to "ensure project affected people have access to sufficient land and appropriate agricultural training to be able to produce enough rice to achieve food security and enhance their livelihoods" (Baxter, 2013, pp. 7–8). The programme is composed of two specific activities, firstly the Farmer Field and Life Schools (FFLS) and secondly a "land preparation" component, which is further described below. The project affected people, whether land owners or land users may sign up to the programme but not all farmers are guaranteed a place in it. According to the ESHIA report, the FFLS is essentially a training programme to equip the project affected people with modern agricultural techniques and practices with the aim of mitigating effects potentially caused by the reduction of agricultural land. This effort is in line with the general development agenda of Sierra Leone, as outlined in the Poverty Reduction Strategy Paper (PRSP), which places a heavy focus on agricultural development. Within the FFLS smallholder farmers participate in a 30 week training programme; cumulatively 1,838 farmers have so far graduated from the 50 FFLS that have been held. Of the 203 sampled households 155 (76%) have benefitted from the project's CSR activity, with an average of just under three years as beneficiaries. Interestingly the selection of programme participants is not dependant on having lost land to the project as 40 participants reported not having lost any land to the project and 19 non-participants had lost land. The second component of the CSR programme is the land preparation component which aims to ensure that each household remains food secure after the leasing of their agricultural land. The project made parts of the leased land available to the local communities and, combined with the FFLS, developed community rice fields in order to allow local households to produce rice and become more food secure. In this collaborative effort the project has provided local communities with a range of agricultural inputs including machinery and classes on operation of the machinery whilst local communities provide labour. The produce is kept by the household which may sell this or consume it. However the project slowly reduced the amount of inputs it subsidised shifting management and costs of operation of the community rice fields fully over to the local population. In 2013 the project terminated the subsidies and this part of its CSR activities ended. Due to the fact that the CSR activities of the project are risk mitigation strategies and require local farmers to invest their time, labour and, increasingly capital, these are not considered as compensatory payments. At this stage it is important to reiterate that the focus of this study rests on a specific area of the project operation, namely on assessing the sufficiency of the paid compensation to the individual smallholder farmer for the loss of his/her agricultural land. An exhaustive impact evaluation of the project, including an evaluation of the benefits of the CSR programme on the overall population is out of the scope of this study.

4 Determining Minimum Compensation for Lost Farmland

4.1 Theoretical Framework

The theoretical model presented in this section borrows heavily from Löwenstein et al. (2015) but is adapted to suit the current case study context of smallholder farmers in Sierra Leone. A household may draw income from a variety of different sources such as from the production and sale of agricultural produce (Y_i^{fa}), from wage labour and from entrepreneurial activities, i.e. from other productive income generating activities (Y_i^{op}) or from receiving transfer income as remittances or public grants (Y_i^{tr}).

Equation 1: Household Total Income

$$Y_i^{ttl} = Y_i^{fa} + Y_i^{op} + Y_i^{tr}$$

Farm income (Y_i^{fa}) is the value of the monetarised farm output net of production costs across the range of crops cultivated by the household including but not limited to rice, cassava, vegetables, and ground nuts. The monetarised farm output, i.e. the household's gross farm income, is distinct from farm sales as it includes the value of the produce consumed by the household at current market prices. This allows for the inclusion of the revenues from farming as well as of the value of the subsistence segment of agricultural production, which in the local setting contributes significantly to both, a household's food security as well as to a household's positive or negative distance from the local poverty line.

Farm output (X_i^{fa}) is a composite bundle consisting of the household specific mix of agricultural outputs. It is produced by combining labour (L_i), physical capital and intermediate inputs (K_i), and land ($Land_i$) at a given technology level (A). We postulate positive marginal productivities of capital and land and allow for either a positive or a zero marginal productivity of labour, the latter being an indication for labour surplus.

Equation 2: Household Farm Output

$$X_i^{fa} = f[A, \overset{+}{K_i}, \overset{+,o}{L_i}, \overset{+}{Land_i}, \overset{-}{Y_i^{op}}]$$

In addition to these factors of production other productive income (Y_i^{op}) is included in the household's production function in order to capture the result of the household's decision to allocate labour either to farming or to other productive activities. A negative sign is expected for other productive income as a household is likely to allocate less labour to farming if other productive activities receive a better pay.

From farm output we can compute the monetarised output of the farm by multiplying the household specific output quantities with their sales prices. The latter are reflected by the household specific average sales price (p_i) where the individual output quantities produced serve as weights. Subtracting the costs associated with agricultural production (C_i^{fa}) and adding lease income (Y_i^{ll}) which is obtained by those who are compensated for

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giving some acres of their farm land to the multinational firm we get the household's farm income. It's worthwhile mentioning that the household's lease income negatively depends on the size of the farmland that is excluded from the land lease and is still available for farming. In other words: A household's lease income is the larger, the larger the leased plot of land, and the smaller the non-leased part is.

Equation 3: Household Farm Income

$$Y_i^{fa} = [f(A, \overset{+}{K_i}, \overset{+,\circ}{L_i}, \overset{+}{Land_i}, \overset{-}{Y_i^{op}})] \cdot p_i - C_i^{fa}(\overset{+}{Land_i}) + Y_i^{ll}(\overset{-}{Land_i})$$

Equation three thus models household farm income and holds for both landowning land using households and non-landowning land using households. Both household types produce agricultural output in accordance to equation 2 which is monetarised using the household specific weighted average sales price p_i.

For all households the farming costs (C_i^{fa}) include those for using capital goods (K) and intermediate inputs (C_i^K) such as tools and equipment, planting material, fertilizers and pesticides, where the consumption is rising with the land size on which the farmers operate. For those households which hire day labour for farming operations wage payment (C_i^{hL}) is an additional component of farming costs whereas the opportunity costs for family labour is not such a farm cost component but captured by the variable Y_i^{op} in the production function. Finally, some of the non-landowning land using households may be expected to pay a land rent (C_i^R) to the landowning family for the right to cultivate the landowning family's land. This rent payment is positively depending on the land size provided by the landowning to the non-landowning families. For landowning land using households the term $C_i^R(Land_i)$ in equation 4 below is consequently 0.

Equation 4: Costs of Agricultural Production

$$C_i^{fa}\left(\overset{+}{Land_i}\right) = C_i^K\left(\overset{+}{Land_i}\right) + C_i^{hL}\left(\overset{+}{Land_i}\right) + C_i^R\left(\overset{+}{Land_i}\right)$$

Equation 5 below describes the relationship between labour invested in other productive income activities (L_i^{op}), the given wage rate of said sources (w), the income obtained through farm yield as described in equation 3 and the labour available to each household:

Equation 5: Household Other Productive Labour

$$L_i^{op} = g\left[\overset{+}{w^{op}}, \overset{-}{Y_i^{fa}}, \overset{+}{L_i}\right]$$

Household farm income is included in equation 5 for the same reason that household other productive income is included in equation 3. The labour invested in other productive income sources described by equation 5 is multiplied by the wage rage to obtain the labour income attained through other productive activities in equation 6 below:

Equation 6: Household Other Productive Labour Income

$$Y_i^{op} = g\left[\overset{+}{w^{op}}, \ \overset{-}{Y_i^{fa}}, \ \overset{+}{L_i}\right] \cdot w^{op}$$

We then insert equation 4 into equation 3 and spill the result of this modification together with equation 6 into equation 1 and take the total differential:

Equation 7: Total Differential of Household Total Income

$$
\begin{aligned}
dY_i^{ttl} &= dY_i^{fa} + dY_i^{op} + dY_i^{tr} \\
&= [dX_i^{fa}] \cdot p_i - dC_i^{fa} + dY_i^{ll} + [dL_i^{op}] \cdot w_i^{op} + dY_i^{tr} \\
&= \left[\begin{array}{l} \dfrac{\partial X_i^{fa}}{\partial A} dA + \dfrac{\partial X_i^{fa}}{\partial K_i} dK_i + \dfrac{\partial X_i^{fa}}{\partial L_i} dL_i \\[2ex] + \dfrac{\partial X_i^{fa}}{\partial Land_i} dLand_i + \dfrac{\partial X_i^{fa}}{\partial Y_i^{op}} dY_i^{op} \end{array} \right] \cdot p_i \\
&\quad - \left[\dfrac{\partial C_i^{K}}{\partial Land_i} + \dfrac{\partial C_i^{hL}}{\partial Land_i} + \dfrac{\partial C_i^{R}}{\partial Land_i} - \dfrac{\partial Y_i^{ll}}{\partial Land_i} \right] \cdot dLand_i \\
&\quad + \left[\dfrac{\partial Y_i^{op}}{\partial w_i^{op}} dw_i^{op} + \dfrac{\partial Y_i^{op}}{\partial Y_i^{fa}} dY_i^{fa} + \dfrac{\partial Y_i^{op}}{\partial L_i} dL_i \right] \cdot w_i^{op} \\
&\quad + dY_i^{tr}
\end{aligned}
$$

Equation 7, third line, shows how agricultural output responds to changes in the state of technology and in the quantities of the used production factors. For simplification we assume that the relative weights of the produced agricultural products in the household specific output bundle remain constant so that the household specific weighted average sales price can be treated as a constant, too. Line four of equation 7 illustrates the reaction of the different farming cost components and of the potential flow of land lease income towards changes in the household specific farm size. The second last line of equation 7 provides insights into the effects of changing wages, opportunity costs and household demographics on the household's labour supply to productive activities other than farming and on the household's other productive income whereas the last line accounts for changes of the household's total income due to exogenous variations of transfer income.

The land grabbing component of the project directly influences farmers' livelihoods by the decreasing availability of farm land ($dLand_i < 0$) which induces falling monetarised farm output, falling farming costs, and potentially increasing income from the lease of the land. Due to the fall in overall farm income the opportunity costs of engaging in

productive activities other than farming are falling likewise which may motivate smallholder households to increase their off-farm activities.

A minimum compensation for lost farmland requires that the land grab leaves the farmers' total income unchanged which implies that the effects of the lost productive land on an individual household's farm income must at minimum be compensated by the additional income that this household receives from leasing its farmland. We make use of equation 7 to determine such a minimum compensation by reducing the impacts covered there to those which are directly brought about by the land grab, by requiring that dY_i^{ttl} equals zero, by considering equation 4 and by rearranging yields.

Equation 8: Comparative Statistics for Sufficiency of Land Lease Payments to Land Using Households

$$-\left[\frac{\partial \overset{+}{X}_i^{fa}}{\partial Land_i} \cdot p_i - \frac{\partial \overset{+}{C}_i^{fa}}{\partial Land_i}\right] \cdot dLand_i \overset{!}{=} \left[\frac{\partial \overset{-}{Y}_i^{ll}}{\partial Land_i}\right] \cdot dLand_i$$

In the case where a land using household is involved in a land grab the individual change in land as recorded on both sides of equation 8 is negative. The difference in the bracket on the left hand side shows the individual household's marginal gain from farming, i.e. it is a measure of the marginal opportunity cost of losing a square meter of farmland. The total left hand side of equation 8 is equivalent to the individual monetary loss, i.e. the loss in producer surplus, the household is exposed to when being affected by a land grab. It is this individual loss in farming income which at minimum must be compensated by lease income (s. the whole right hand side of equation 8). The sufficient condition for such a full compensation is the equality of the brackets on both sides of the equation. The household specific marginal loss in producer surplus $-\left[\frac{\partial \overset{+}{X}_i^{fa}}{\partial Land_i} \cdot p_i - \frac{\partial \overset{+}{C}_i^{fa}}{\partial Land_i}\right]$ must be balanced by an equally large marginal compensation payment $\left[\frac{\partial \overset{-}{Y}_i^{ll}}{\partial Land_i}\right]$. With that the individual household is as well-off with as without the land grab. Under such an individualized compensation rule the land lease will leave the local distribution of welfare unchanged which implies that the land grab does not produce anti-poor distributional effects.

4.2 Implications of flat-rate payments to compensate for the loss of land

This claim that a land grab should not produce anti-poor distributional effects is in sharp contrast to the compensation schemes applied in Sierra Leone (s. section 3.2) and elsewhere in developing countries, where in the case of land leases – apart from legally required annual payments made to the state and to local authorities – the land leasing firm pays the involved landowning households an annual flat rate per unit of leased land which is codified by the body of formal laws of the host country which regulates land acquisition and lease. Such compensation schemes obviously violate the above derived

minimal compensation rule in two ways, i.e. by excluding non-landowning land using households from compensation and by applying a compensatory flat rate which does not reflect the opportunity cost of the loss of land.

Both violations are developing country specific. The first one, i.e. the exclusion of landless land users, can be explained by the fact that the formal compensation rules which guide land grabs ignore the co-existence of formal and customary land laws in developing countries. The second one, i.e. the application of a compensatory flat rate rather than of a compensation for the opportunity costs of lost land, is the consequence of accepting neo-feudal land tenure systems where few enjoy the fruits of formal land rights and many are excluded from them.

Imagine that the land lease takes place in an industrial country setting. There, formal contracts with the landowner protect the interests of land using but non-landowning families. This implies that if a landowner wants to get involved in a land lease he or she, due to the existence of formal land use contracts, will be forced to contact the land user beforehand and to negotiate the conditions under which the existing land use contract can be terminated. In turn, the land user either gets sufficiently compensated by the landowner or s/he will simply obstruct the landowner's engagement in the lease. Due to the existence of formal land use contracts the rationality as proposed by equation 8 automatically rules land lease bargains, guarantees that not only landowners but also land users are part of the game and makes sure that the land users are either at minimum compensated for their individual producer surplus losses or that the land lease does not take place at all.

The situation is totally different in a developing country setting where formal and customary land laws coexist. Here, non-land owning land using households do not hold any formal land use rights but their land use is governed by customary law only (see section 3.1). As the regulations of large-scale land acquisitions and leases exclusively focus on the formal landowners the non-land owning land using households have no say in the land lease negotiations. There are no enforceable contracts between them and the formal landowners which protect the landless' interests in the case where the landowner decides to get involved in a land lease so that, as a result of ignoring customary land use rights in the formal compensation schemes, the landless are evicted without being compensated for their producer surplus losses.

With respect to the flat rate payments to formal landowners, as foreseen under the formal compensation schemes, it obviously can't be expected that they meet the requirements of a minimum compensation as they ignore the site specific land properties and specific production modes which impact on the individual opportunity cost of losing land.

From the formal landowners' perspective the flat rate character of the compensatory payment may not be a problem if s/he only owns and does not use the land, as can be illustrated by adjusting equation 8 to that case.

Equation 9: Effects of a Flat Rate Compensation to Landowning Not-land Using Households

$$-\left[\frac{\partial C_i^R}{\partial Land_i}\right] \cdot dLand_i \leq \frac{\partial \overline{Y}_i^{ll}}{\partial Land_i} \cdot dLand_i$$

The formal landlord does not use the land but gives it away for use under customary law. In consequence, the formal landlord does not produce and does not sell own agricultural output, does not use production factors and is therefore not confronted with production costs. Instead he may, under customary law, receive an informal and marginal land rent (C_i^R) by the land user which adds to the landlord's overall income. In the case of a lease the landowner gains the formal compensatory flat rate per leased acre $\frac{\partial \overline{Y}_i^{ll}}{\partial Land_i}$ and loses the negligible per-acre rent paid by the household which formerly used the land under customary law $\frac{\partial C_i^R}{\partial Land_i}$. Hence, due to the lease agreement the formal land owning but not land using household most probably experiences a windfall gain and is satisfied with the flat rate compensation while at the same time the landless land user stays uncompensated as argued above.

Landowners who at the same time farm on some parts of their land while giving other parts away for use under customary law may develop a slightly different perspective on the sufficiency of a flat rate compensation scheme if the envisaged land lease affects both types of land. For the loss of self-cultivated farm land the flat rate payment may be too small to fully compensate for the producer surplus losses, so that equation 8 will be violated. On the other hand the flat rate compensation will produce windfall gains (s. equation 9) for that land which previously was provided to land users under customary law. In turn, they will bargain with the land grabbing firm for a higher flat rate and/or will try to avoid the allocation of own-used farm land to the lease.

This theory-based analysis of the compensation scheme applied in land-lease contexts in Sierra Leone raises the expectation that the scheme widens the income gap between formal landowners and informal landless land users not only by creating windfall gains for the presumably non-poor formal landowners but by also dispossessing the presumably poor landless land users of their main income source without providing any compensation.

5 Methodological Approach

5.1 Sampling and Data Collection

The target population has already been implicitly discussed in various sections above; however it is important to explicitly mention it here again in order to illustrate the reasoning for the sampling procedure. The population of interest is those households which were (are) cultivating land within the area of operation of the land grab project, irrespective of whether they own the land that they were cultivating or not. Instead a dummy variable will be used in order to capture any possible ownership effects in the farm income regression. From this target population a stratified random sample of 203 local farming households was selected in eight communities across three chiefdoms within the project's area of operation, i.e. within the 57,000 ha leased by the project. The eight communities were selected based on similarities of three parameters, (i) proximity to the motorway, i.e. access to logistical infrastructure; (ii) length of time since the project became active in the community; and (iii) access to the CSR Programme of the project.

The standardised survey was composed of six sections each focusing on a different aspect of local farming households

- The Introductory Section captures information on the interview, such as location, identification number, and name of the enumerator
- Section A collects data on household characteristics such as number of household members and educational status
- Section B investigates the land use characteristics of the farming household
- Section C asks questions related to agricultural production and the use of agricultural inputs
- Section D questions the farmers on their participation and received benefits of the FDP
- Section E finally captures household income and expenditures accounting for various income sources.

The data collection was conducted by means of a standardised household survey (see Annex I) which was completed in an interview setting by each of the 203 local farming households selected in the stratified random sample. The household data was collected between August and October 2013 with a recall period of one year in order to ensure no over or underestimation of, for example, costs or incomes due to seasonal variation.

5.2 Estimation Procedure for Minimum Compensation for Lost Land

As argued above a minimum compensation for lost farmland requires that the land grab leaves the farmers' total income unchanged which implies that the effects of the lost productive land on an individual household's farm income must at minimum be compensated by the additional income that this household receives from leasing its farmland. In order to quantify this minimum compensation a counterfactual must be constructed in which the agricultural income of each household is estimated given that they have access to all the land cultivated prior to the land grab. Naturally increased cultivated land is associated with higher costs of agricultural production which must also

be quantified for the counterfactual situation. The following eight steps were taken to complete this task:

1. Run the factual agricultural income regression: Equation 3 ($Y_i^{fa\,F}$)
2. Estimate factual sample agricultural incomes ($\widehat{Y}_i^{fa\,F}$)
3. Run the factual costs of agricultural production regression: Equation 4 ($C_i^{fa\,F}$)
4. Estimate factual sample agricultural production costs ($\widehat{C}_i^{fa\,F}$)
5. Identify and alter the variables impacted by the land grab
6. Estimate counterfactual sample agricultural income ($\widehat{Y}_i^{fa\,C}$)
7. Estimate counterfactual costs of agricultural production ($\widehat{C}_i^{fa\,C}$)
8. Calculate the compensation payment required for equation 8 to hold given the results of the previous steps

Using the data collected from the 203 sampled households the factual agricultural income regression based on equation 3 above can be estimated as follows:

Equation 10: Factual Agricultural Income

$$Y_i^{fa\,F} = \widehat{\beta}_0 + \widehat{\beta}_1 Land_i^F + \widehat{\beta}_K \boldsymbol{K_i} + \widehat{\beta}_L \boldsymbol{L_i} + \widehat{\beta}_2 Y_i^{op} + \widehat{\beta}_3 Y_i^{tr} + \varepsilon_i$$

Farmers use various forms of physical capital and agricultural inputs (vector K_i) to produce agricultural goods. For this estimation the various capital expenditures were pooled into the variable intermediate inputs which include physical capital, such as tools and equipment, as well as agricultural inputs, such as seeds and fertilisers. Another form of capital is the rent payments (C_i^R) which the farmer pays to the land owning family; these will be included separately from intermediate inputs below. Finally, other costs of production which captured costs of agricultural production beyond those captured by the ones referred to above were pooled into K_i also. These other costs of production were collected to ensure that all costs of agricultural production were accounted for[3]. Similarly vector $\widehat{\beta}_L L_i$ includes both household and hired labour. Household labour is captured by means of both percentage of dependents in a household and number of adults in the household[4], non-household labour, on the other hand, is captured by expenditure for hired labour. In step two we estimate the factual agricultural income ($\widehat{Y}_i^{fa\,F}$) for each of our households using the parameter estimates obtained by regressing equation 10 above. Due to the fact that costs of production are influenced by available land[5] equation 11 below is estimated (step 3).

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3   Figure 8 below shows that these costs are negligible
4   Household members over the age of 18
5   Equation 4 above

Equation 11: Factual Costs of Production

$$C_i^{fa\,F} = \widehat{\alpha}_0 + \widehat{\alpha}_1 Land_i^{F} + \varepsilon_i$$

Based on these coefficients the factual costs of production $\widehat{C}_i^{fa\,F}$ for each household in our sample were estimated (step 4). Data were collected on how many acres a household cultivated in the last year[6] ($Land_i^{F}$) as well as how much land was lost to the land lease[7]. Consequently adding the land cultivated in the last year to the land lost to the land lease provides the counterfactual: the land that would have been cultivated had the land lease not taken place[8] ($Land_i^{C}$). Steps 6 and 7 require the substitution of $Land_i^{F}$ for $Land_i^{C}$ in equation 10 and 11 respectively to obtain estimates for $\widehat{Y}_i^{fa\,C}$ and $\widehat{C}_i^{fa\,C}$ respectively. $\widehat{Y}_i^{fa\,C}$ is the counterfactual farming income that each household would have earned had they had $Land_i^{C}$ at their disposal whilst $\widehat{C}_i^{fa\,C}$ are the costs that each household would have incurred for the production of $\widehat{Y}_i^{fa\,C}$.

The final step, which establishes the average rent payment per acre of lost agricultural land for the present sample based on equation 8, is represented by equation 12

Equation 12: Estimation of Sufficient Land Lease Payment to Land Using Households per Lost Acre and Year

$$\frac{\partial Y_i^{ll}}{\partial Land_i} = \frac{\left(\sum_{i=1}^{n}\widehat{Y}_i^{fa\,C} - \sum_{i=1}^{n}\widehat{Y}_i^{fa\,F}\right) - \left(\sum_{i=1}^{n}\widehat{C}_i^{fa\,C} - \sum_{i=1}^{n}\widehat{C}_i^{fa\,F}\right)}{\sum_{i=1}^{n}Land_i^{C} - \sum_{i=1}^{n}Land_i^{F}}$$

The sum of the household specific ($\sum_{i=1}^{n}\widehat{C}_i^{fa\,C} - \sum_{i=1}^{n}\widehat{C}_i^{fa\,F}$) costs of agricultural production savings brought about by a reduction of agricultural land are subtracted from the household specific farming income losses brought about by the lost agricultural land ($\sum_{i=1}^{n}\widehat{Y}_i^{fa\,C} - \sum_{i=1}^{n}\widehat{Y}_i^{fa\,F}$). This provides the net income loss of the whole sample of 203 households which leased 769.5 acres to the project. In order to obtain a per acre land lease payment the net income loss is divided by the land leased to the project.

5.3 Model Specification

In order to estimate the above mentioned regressions it is necessary to identify the correct functional form of the relationship between the theory-derived variables. The Box-Cox transformation is a widely used power transformation tool which determines the precise power transformation of the data which would yield the best possible model fit. This can be used, with the researcher's discretion, in order to determine the most appropriate

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6   532 acres for the sample of 203 households
7   769.5 acres
8   1,301.5 acres

model fit through the aid of Tukey's ladder of transformations. See Löwenstein et al. (2015; pp. 38-40) for a more detailed explanation of model specification.

For the total household income regression a λ value of 0.535 was obtained suggesting a mathematical transformation of the variables through a square root. This, however, causes interpretative difficulties and as such a linear model was chosen. A similar situation arose with the farm output model where a λ value of 0.1669 was found, which was significantly different from zero. Noteworthy is that the model specification guidelines set by Griffin, Montgomery, and Rister (1987) were used which can be summarised as follows:

1. maintenance of a priori assumptions (theoretical considerations)
2. estimation procedures
3. data structure and concerns
4. application requirements of the model

Points 1 and 4 were applied in combination with the λ value of 0.1669 to specify also for the household farm output model a linear relationship between the explanatory variables.

6 Results of the Rent Payment Assessment

6.1 Description of the Sampled Households

Before diving into the income regressions it is interesting to compile a rough socio-economic profile of the 203 households sampled in the project area, focusing on their main sources of income and expenditure. Three age categories were created with adults being those people 18 and older; those people between the ages of 10 and 17 were classified as adolescents; and under the age of 10 were classified as children. The sampled households were composed of 35% children, 20% adolescents and 45% adults. For the calculation of percentage of dependents in a household children and adolescents were classified as dependents. An interesting, yet unsurprising, observation is that the majority of household members are under the age of 18. The average household size in the sample was 9 members.

In order to gain an idea of the distribution of income between the sampled households it is useful to divide the sample into quintiles. This allows an insight into how much wealth, in total and from the three income categories, is earned by each quintile. Figure 4 below illustrates how total income (Y_i^{ttl}), farming income (Y_i^{fa}), other productive income (Y_i^{op}), and transfer income (Y_i^{tr}) are distributed between sample quintiles. The poorest 20% of the households (Q1) earn 1.8% of total sample income whilst the wealthiest 20% (Q5) earn 52.7% of the income (Y_i^{ttl}). Similarly the first quintile earned 1.9% of the total farming income (Y_i^{fa}) earned by the sample whilst the fifth quintile earned 59.9% of the total farming income (Y_i^{fa}) of the sampled households.
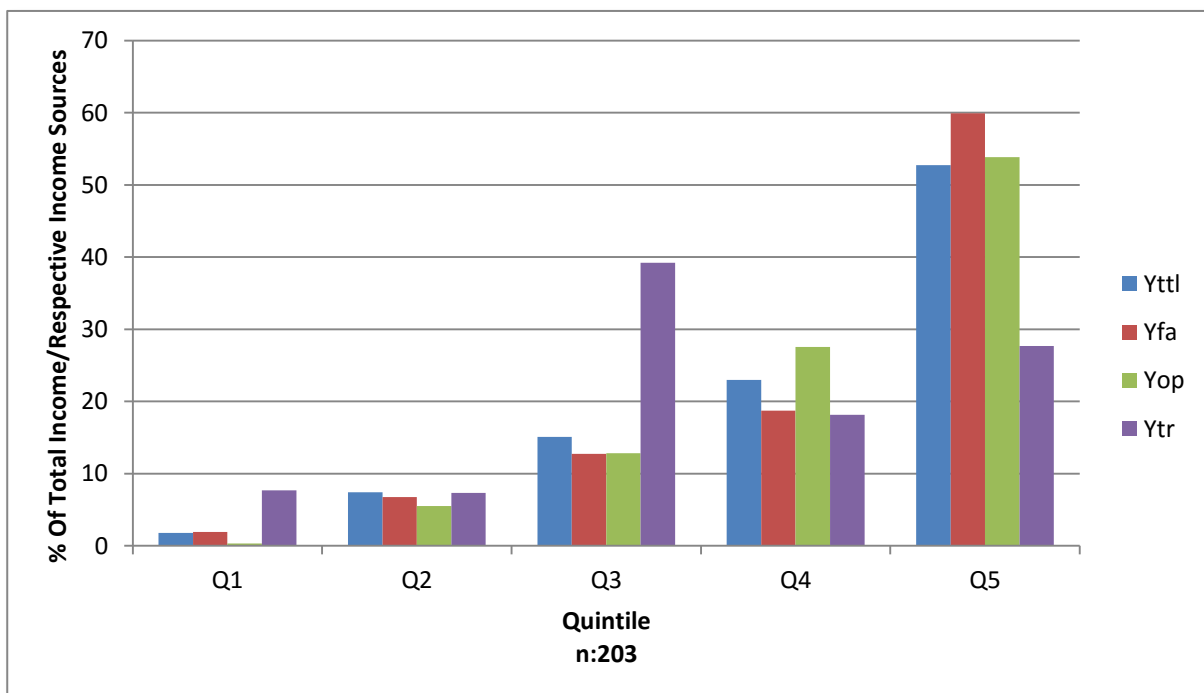
Figure 4: Distribution of Total Sample Income by Sources and Income Quintiles, (Annual, 2012/2013)
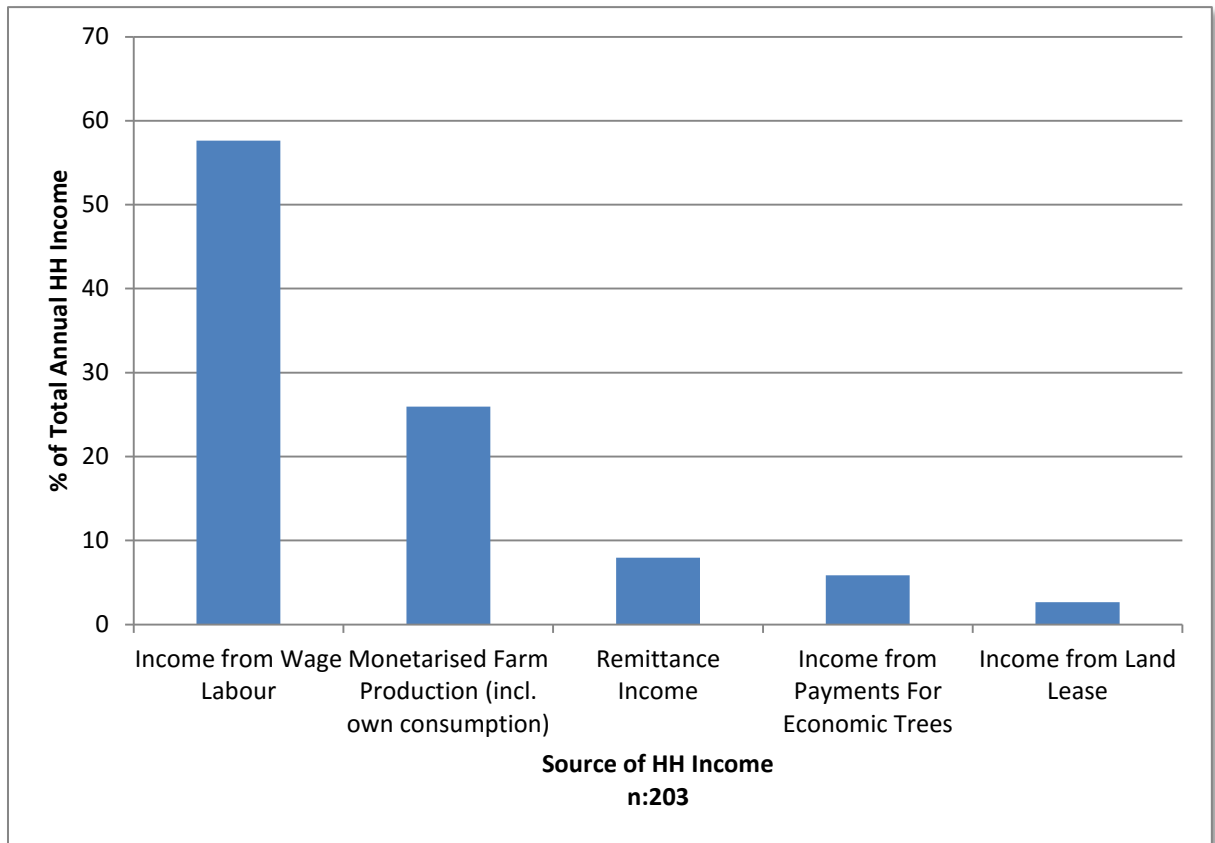
Figure 5: Distribution of Total Annual Household Income by Major Categories (Annual, 2012/2013)

Figure 5 above shows the composition of total annual household income of the sampled households grouped into five categories of income sources. This shows us how much of the total sample income is earned from the five income categories listed. Interestingly the dominant source of household income is not from agricultural production but wage labour (Y_i^{op}). This could be due to one of two reasons, or a combination of both. Firstly, the reduction of agricultural land has led to a displacement of farmers in the project area forcing them out of agricultural activities into other sectors. This phenomenon is well documented (Borras Jr. & Franco, 2012; Hall, 2011; Wolford, Borras, Hall, Scoones, & White, 2013); however the investigation of this was beyond the scope of this study. Secondly, the dominance of wage labour as a source of household income may be due to the largely subsistence format of agricultural activity in the research area. Nevertheless, without further investigation into this it is not possible to make a conclusive argument for one or the other.

Again, the sampled households are divided into income quintiles to take a closer look at the relative importance of the three major sources of income (farming, other productive, and remittance) upon which a household can draw for each quintile. Whilst figure 4 above illustrated the distribution of total, agricultural, other productive, and transfer income across the five quintiles figure 6 below illustrates how much of the total income of each quintile is obtained from farming activities, other productive activities, transfer incomes, and project related incomes.
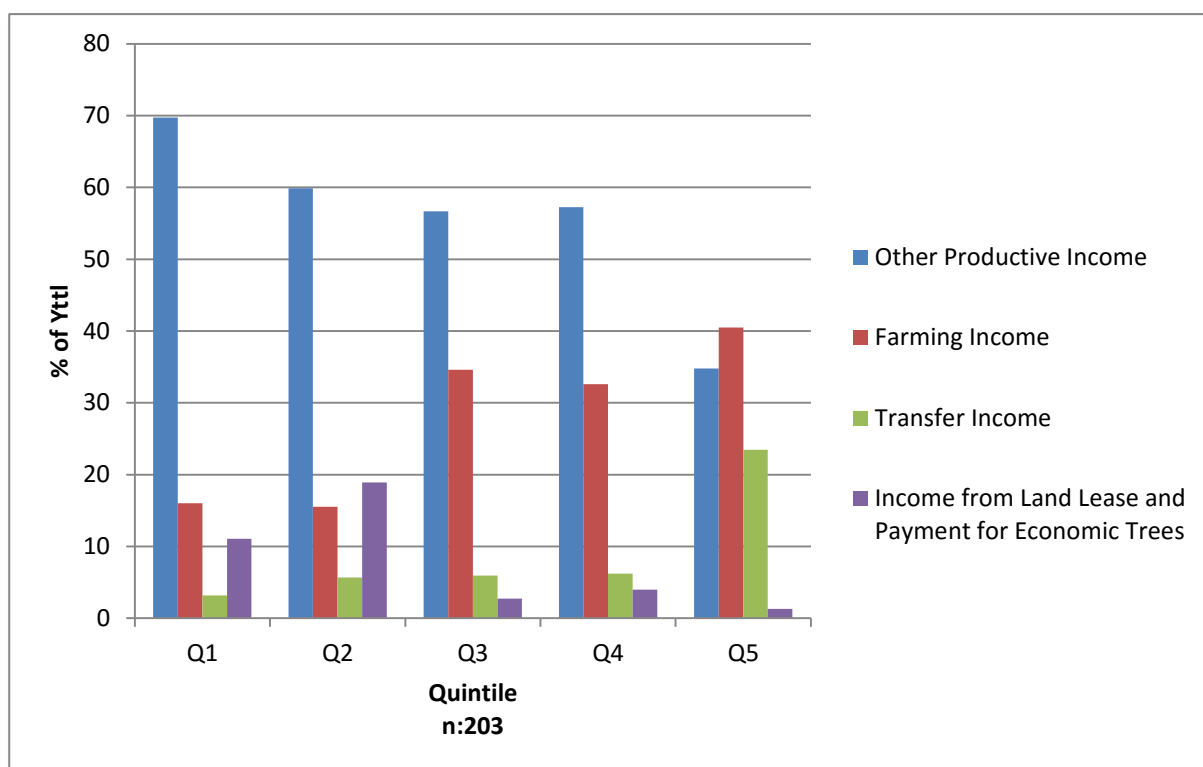
Figure 6: Share of Total Income (Y^{ttl}) Derived from Major Income Sources (per quintile), (Annual, 2012/2013)

Relative to the total household income farming income is ubiquitously important across all quintiles. The first and second quintile obtain the smallest income shares from farming at 16% and 15.5%, respectively. In contrast, the richest 20% of households earn 40.5% of their total household income from farming. As with figure 5 above it is not possible to draw causal conclusions based on the current (i.e. post land grab) relative importance of various income sources for each income quintile.

The counterpart to Figure 5 above is Figure 7 below describing the average composition of household expenditure categorised into six different expenditure types, food purchases, education related expenditures, health related expenditures, purchase of wood for fuel, acquisition of construction materials for the local house, and the costs of agricultural production. This data reflects the average household expenditure of the 203 farming households of the sample in the situation where their land has been leased away to the project. As figure 7 shows, the largest portion, 64.6%, of household expenditures went to purchasing food.
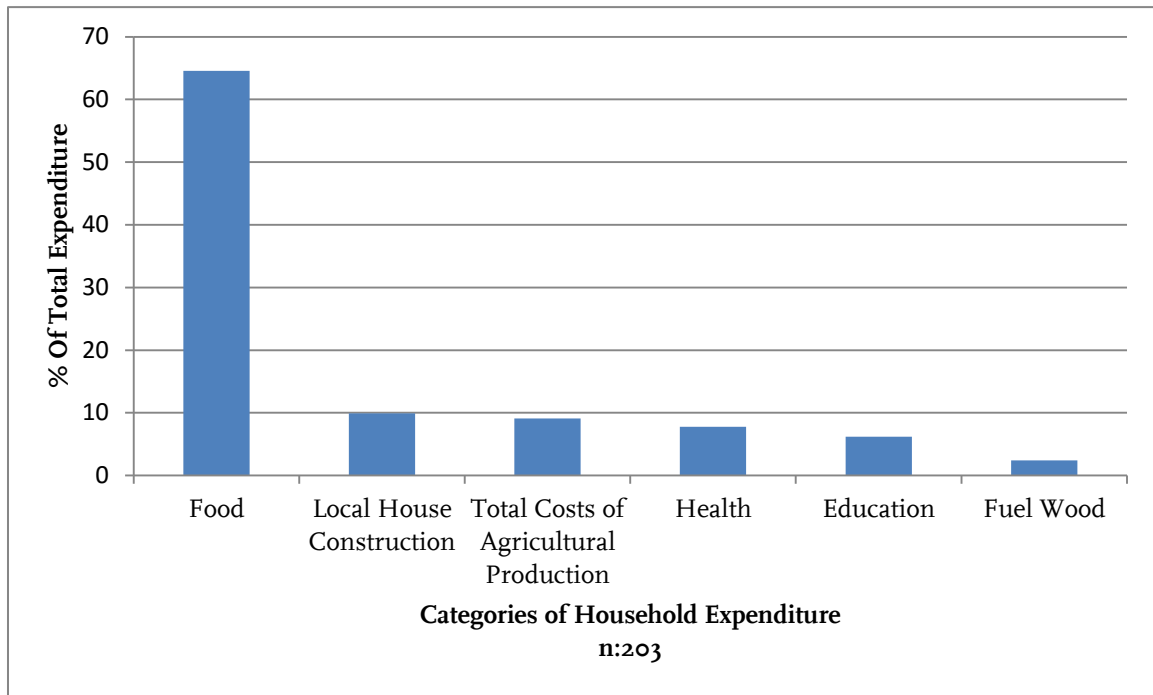
Figure 7: Distribution of Total HH Expenditure by Major Categories, (Annual)

Since the focus of the subsequent analysis is agricultural production it is useful to take a look at the distribution of the total cost of agricultural production (C_i^{fa}) for the 203 sampled households; displayed in figure 8 below.
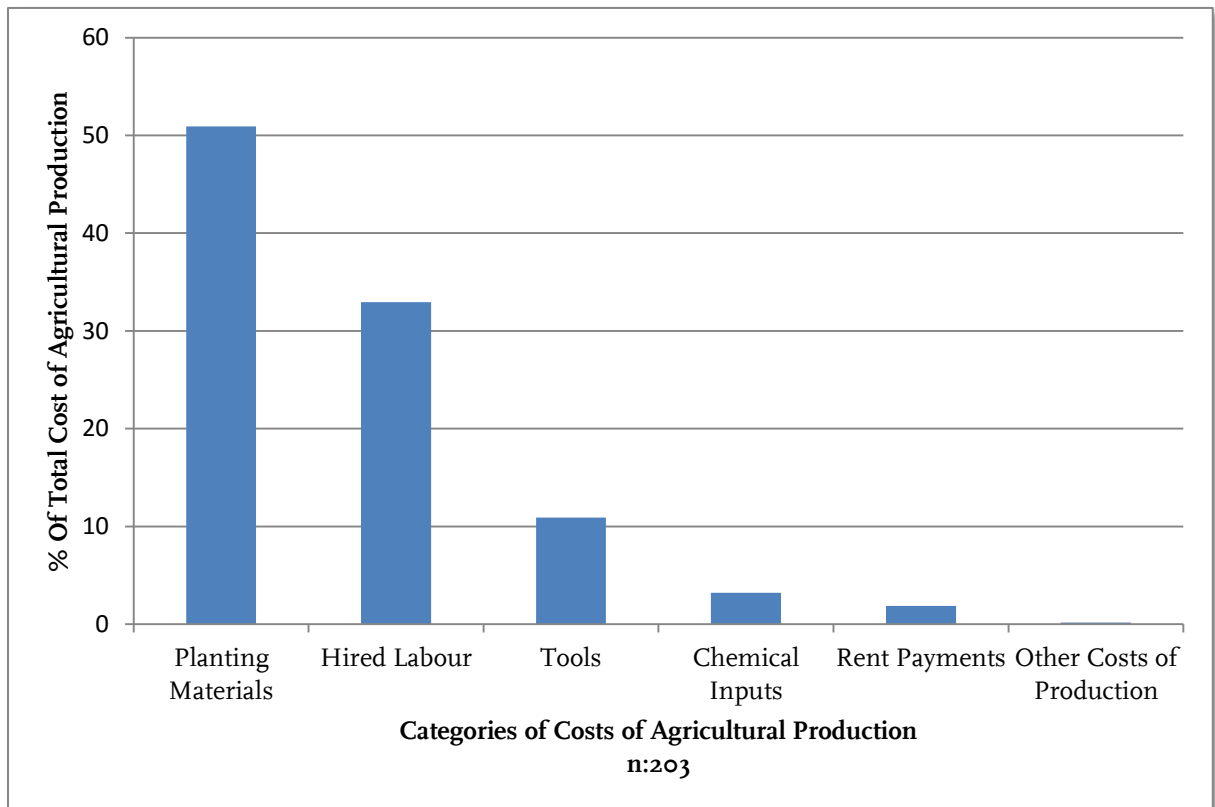
Figure 8: Distribution of Total Cost of Agricultural Production by Major Categories

Planting materials, tools, and chemical inputs are the largest source of agricultural production related expenditure at 65% and together are referred to as physical capital (C_i^K). Costs of hired labour (C_i^{hL}) is the next largest agriculture related expenditure category at 33% of total expenditures and rent payments (C_i^R) account for just under 2% of costs. Other costs of production was included in order to exhaustively capture agriculture related costs, in case a respondent incurred expenses that they felt did not fit in one of the given categories. This was done in order to ensure no costs went unobserved but at 0.2% of total costs is negligible.

6.2 Determining Minimum Compensation for Lost Agricultural Land

In order to explore the determinants of total household income within the sample the full equation 1 (cf. Section 4.1) was estimated and is summarised in table 2 below. Noteworthy is that throughout the course of the empirical analysis a statistical significance level of 10% was applied. The difference between the full model and the parsimonious model is that all statistically insignificant variables (at a 10% level) were sequentially excluded until all explanatory variables included in the regression were statistically significant.

Due to the diversity of a household's income sources and large family sizes it is not possible to obtain precise, credible, data on hourly distribution of a household's available labour across the various activities. Consequently household labour will be captured by the number of adults, i.e. household members over 18 years of age, in the household and the percentage of dependents in the household. Similarly instead of attempting to capture the time that non-household hired labourers spend on the fields the expenditure on labour will be used which households are better informed on than on the time spent. This combination captures the labour employed by each household (L_i, C_i^{hL}). Household labour was found to positively and significantly influence income, each adult contributing between SLL 180,711 and SLL 195,711 to total household income. Hired labour was statistically insignificant.

As mentioned in section 5.2 physical capital and agricultural inputs were pooled into one variable (intermediary inputs) which includes tools, seeds, fertiliser and other agricultural inputs.

Agricultural land in the project area comprises three categories, i.e. uplands, inland valley swamps and "bolilands" (floodplains and lowlands that flood each year). Inland valley swamps and bolilands are of particular interest to the area of this study. Both lowland categories are well-suited for rice production whilst uplands are utilised for a wider variety of crops by the local households. When referring to number of acres cultivated in the last year ($Land_i$) this study thus refers to the sum of these three categories of land, which the household cultivated and excludes any uncultivated land (e.g. fallow land). Each acre of cultivated land contributes to total household income by between SLL 283,706 and SLL 283,706. In order to capture any possible effects of landownership the landowner dummy variable was included, but found statistically insignificant.

Table 2: Exploratory Estimation of Sample Households' Total Income

VARIABLES[9]	(Full Model) Total Household Income	(Parsimonious Model) Total Household Income
L_i: % of Dependants in HH	3,761	
	(0.656)	
L_i: Adults in Household	**195,711**	**180,441**
	(0.004)	(0.002)
K_i: Intermediary Inputs	**2.671**	**2.648**
	(0.000)	(0.000)
C_i^{hL}: Expenditure on Labour	-0.104	
	(0.896)	
C_i^R: Rent Payments	**11.786**	**12.342**
	(0.032)	(0.020)
Y_i^{tr}: Remittance Income	**0.894**	**0.890**
	(0.001)	(0.001)
Y_i^{op}: Income from CSR programme	**1.011**	**1.046**
	(0.010)	(0.007)
$Y_i^{ll+trees}$: Income from land lease	**1.201**	**1.297**
	(0.117)	(0.082)
Y_i^{op}: Income from wage labour	**0.938**	**0.944**
	(0.000)	(0.000)
$Land_i$: Acres cultivated in the last year	**284,118**	**283,706**
	(0.000)	(0.000)
Landowner	241,651	
	(0.612)	
Constant	-1,496,513	-1,234,435
	(0.024)	(0.000)
Observations	197	197
Adjusted R-squared	0.741	0.745

The variable $Y_i^{ll+trees}$ includes the income from the land lease (Y_i^{ll}) as well as the compensation received for the loss of economic trees (Y_i^{trees}) in the same year. As argued above (cf. Section 3.3) the income generated through the project's CSR activities is not considered a compensatory payment due to the required investment of farmers' labour and capital and consequently falls under other productive income (Y_i^{op}). Both the income from $Y_i^{ll+trees}$ and the project's CSR activities were found to contribute to total household

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9 All monetary values are in local currency, the Sierra Leonean Leone (SLL) at 5810SLL to the Euro

income at between SLL 1.201 and SLL 1.297, and between SLL 1.011 and SLL 1.046 respectively.

Table 3 below presents the results of the household farm income regression (cf. Equation 3 and Equation 10), again for the full and for the parsimonious models as was the case in table 2 above. The variables of the full model were taken directly from the theoretical model as explained in section 4. Before progressing with the analysis it is noteworthy to compare the observed and model predicted values for factual household farm output.

Table 3: Estimation of Sample Households' Annual Farm Income

VARIABLES	(Full Model) Estimated Value of Total Farm Output	(Parsimonious Model) Estimated Value of Total Farm Output
L_i: % of Dependants in HH	**-12,806**	**-13,162**
	(0.152)	(0.096)
L_i: Adults in Household	26,996	
	(0.594)	
$Land_i$: Acres cultivated in the last year	**238,117**	**284,656**
	(0.001)	(0.03)
K_i: Intermediary Inputs	0.124	
	(0.764)	
C_i^{hL}: Expenditure on Labour	1.276	
	(0.378)	
Y_i^{op}: Income from wage labour	-0.042	
	(0.243)	
C_i^R: Rent Payments	-1.178	
	(0.852)	
K_i: Expenditure on Other Costs of Production	-4.884	
	(0.361)	
Y_i^{tr}: Remittance Income	**-0.688**	**-0.703**
	(0.003)	(0.003)
Y_i^{op}: Total yield bushels from the FDP	-4,738	
	(0.792)	
Landowner	-211,453	
	(0.489)	
Constant	**1,923,223**	**2,026,385**
	(0.010)	(0.000)
Observations	162	162
Adjusted R-squared	0.129	0.147

The full model predicts an aggregated farm output for the sample worth SLL 311.1 million (€ 56,231)[10] whereas the parsimonious model predicts an aggregated sample farm output of a value of SLL 311.1 million (€ 56,229). The observed aggregate farm output (SLL 311.1 million; € 56,231) for the sample thus deviates very little from the predicted values namely by SLL 21.66 (< €0.1) for the full model and SLL 9,020 (€ 1.63) for the parsimonious model.

The available labour of each household was captured by three variables: i) adults in the household, which are defined as individuals over the age of 18; ii) the percentage of dependants, i.e. household members up to 18 years of age, and iii) the expenditure on hired labour. As expected, the number of adults positively influences agricultural income, albeit insignificantly, and the percentage of dependants negatively influences it. The expenditure on hired labour was found to be statistically insignificant. Capital was captured by Intermediary Inputs and expenditures on other costs of production (cf. Figure 8, Section 5.2) both of which statistically insignificant.

Rent payments (C_i^R) of the landless land users was included and found to be statistically insignificant, likely due to the small number of households which actually reported making such payments. Income from wage labour (Y_i^{op}) was included due to the possibility of interaction effects between the labour allocation to the various economic activities; however was found to be statistically insignificant. Along similar reasoning remittance income (Y_i^{tr}) was included and found to significantly and negatively influence agricultural income. The output obtained in the context of the FDP was included but found to be statistically insignificant. In order to capture any possible effects of ownership on the cultivation of the land a dummy variable for the handful of landowning land using households was also included and subsequently excluded in the parsimonious model due to lack of statistical significance.

Acres cultivated in the last year ($Land_i$) was found to be statistically significant; one additional acre of cultivated farmland increases households' annual farm income by between SLL 238,117 and SLL 284,656. It was explained above (cf. Equation 8) that the minimum level of rent required was that payment which fully compensates the land users for the welfare loss suffered due to the reduction of their available productive, agricultural, land. In order to do this the factual production based on the current land use was analysed. Recall that the data collection took place after the land lease so the factual (current) land under cultivation is assumed to be less than in the counterfactual situation, in which the farmers would still have access to the land they leased to the project for cultivation purposes. Thus table 3 shows the results of step one in section 5.2. Steps 2 through 7 are aggregated and summarised for all sample households by table 4 below.

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10 An exchange rate of 5533SLL to the Euro was used.

Table 4: Farm Output Reduction

	SLL		€	
	Full Model	Parsimonious Model	Full Model	Parsimonious Model
$\widehat{Y}_i^{fa\,F}$: Factual Farm Income	311,136,008	311,127,079	56,231	56,229
$\widehat{Y}_i^{fa\,C}$: Counterfactual Farm Income	566,332,814	595,739,138	102,352	107,666
Gross Farm Output Reduction	255,196,805	284,612,058	46,121	51,437
$\widehat{C}_i^{fa\,F}$: Factual Costs of Production	33,672,424		6,086	
$\widehat{C}_i^{fa\,C}$: Counterfactual Costs of Production	82,377,180		14,888	
$\widehat{C}_i^{fa\,C} - \widehat{C}_i^{fa\,F}$: Costs Saved	48,704,756		8,802	
Net Farm Output Reduction	206,492,049	235,907,302	37,319	42,635

Step two uses the parameter estimates in table 3 and the observed variable values to calculate the factual sample agricultural incomes ($\widehat{Y}_i^{fa\,F}$). Table 4 shows that the factual agricultural income for the sample was around €56,230. Step 3 runs equation 11 where we found that each acre of cultivated land increases costs by SLL 63,294 (€ 11.44/acre). From this parameter estimate we can calculate the factual ($\widehat{C}_i^{fa\,F}$ = €6,086) and counterfactual ($\widehat{C}_i^{fa\,C}$ = €14,888) costs of production by multiplying it by the factual (532 acres) and counterfactual (1301.5 acres) available agricultural land respectively (steps 4 and 7). For each household in the sample data on acres currently cultivated and acres leased is available.

From the regression results in table 3 we know that each additional acre of cultivated farmland yields between SLL 238,117 and SLL 284,656. Consequently it was possible to calculate the counterfactual agricultural income ($\widehat{Y}_i^{fa\,C}$) for each household and thus the sample as a whole (step 6). As shown in table 4 this was found to be between €102,352 and €107,666 for the aggregate sample. Subtracting the factual agricultural income from the counterfactual gives us the sample's gross farm output reduction. From this we subtract the saved costs of production ($\widehat{C}_i^{fa\,C} - \widehat{C}_i^{fa\,F}$) to obtain the net farm output reduction due to the land lease which is between €37,319 and €42,635.

Thus for the sampled households to suffer no welfare loss due to the reduced agricultural output caused by the land lost the project would have to pay between €37,319 and €42,635 annually for the 769.5 acres which translates to a payment of between €48.5 and €55.41

per acre and year, as compared to the average € 3.82 per acre that the sample households actually received in 2012/2013 (cf. Equation 8).

6.3   Discussion of the Level of the Project's Compensatory Payment

The project has initiated a number of different compensation schemes (cf. Section 2). As mentioned above, the income gained through the sale of the goods which were produced through the CSR programme are not included in the compensatory payments section as they do not constitute a payment for the loss of land, or economic trees, but a profit from household labour (cf. Section 3.3). Equation 8 in section 4 essentially states that, ceteris paribus, the compensatory payment to be received by the farming households must equal the reduction in monetarised agricultural output, net of costs, that could have been obtained by the land users had they retained use rights to the land. From the results presented above we assume that, ceteris paribus, for the case of this project the reduction of monetarised agricultural output in the sample attributed to the land lease scheme lies between €48.5/acre/pa and €55.41/acre/pa net of saved costs of production.

According to Sierra Leonean law the recommended annual compensation for leased agricultural land is set at US$5 (€3.91) per acre which is to be distributed amongst the four specified stakeholder groups, leaving the landowners with €1.41/acre (cf. Table 1). As mentioned above the acknowledgement agreements introduced by the project increased the rent payment to the landowners to €2.5/acre. However, the interviewed households claimed to have received an average of €3.82/acre in the year preceding the survey, the reason for this remains unclear but might indicate some confusion, on the part of some farming households, as to whether received compensation is for lost land or lost economic trees (cf. Section 3.2). This suggests that although non-landowning land using households are not recognised by Sierra Leonean law (cf. Figure 1) they did, in this instance, receive some compensation for the loss of their cultivated land. Section 6.4 below will investigate the distribution of rent in more detail. Suffice it to conclude here that both the prescribed land lease payment (€2.5/acre to land owners) and the factually received land lease payment of the sample households (€3.82/acre) significantly underestimate the value of agricultural land which should have been 12 to 14 times higher in order to sufficiently compensate the land-using households, for which no officially recognised land rights exist, for their lost agricultural output.

6.4   Distributional Effects the Compensation Mechanism

It has been shown that the officially recognised compensation payment as well as the compensation actually received by the sample's households falls significantly short of the actual loss of agricultural output, which is between €48.5/acre and €55.41/acre for land using households. In addition to establishing overall effects on the aggregate sample it is essential to establish differential impacts of the land lease between socio-economic segments of the sample households. For this purpose two sets of sub samples were created. Firstly, the sample was divided into quintiles[11] based on total household income (

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11   Note that quintiles 1, 2, and 3 include 41 households whilst quintiles 4 and 5 include 40 households each

Y_i^{ttl}) and for each quintile the percentage of household total income (Y_i^{ttl}) lost due to the project net of observed compensatory payments[12] was calculated (Figure 9). This was done in order to determine whether poorer households were disproportionately affected when compared to richer households. Secondly the sample was divided into land owners and non-landowning land users and the analysis was repeated.

Identical to the methodology employed above (cf. Section 6.2) the income loss was calculated using both the full and the parsimonious model for each of the sample's income quintiles. A clear trend is visible in figure 9, as the relative income loss net of compensatory payments received by the households is larger for poorer households. The poorest 20% (Q1) lost between 51% and 56% of their income due to the land grab whereas the wealthiest 20% (Q5) lost between 6% and 9% of their total household income. This distribution of the welfare losses between the income quintiles of the sample may be a result of the problems arising from the coexistence of a customary and formal land tenure system discussed in chapter 3 above.
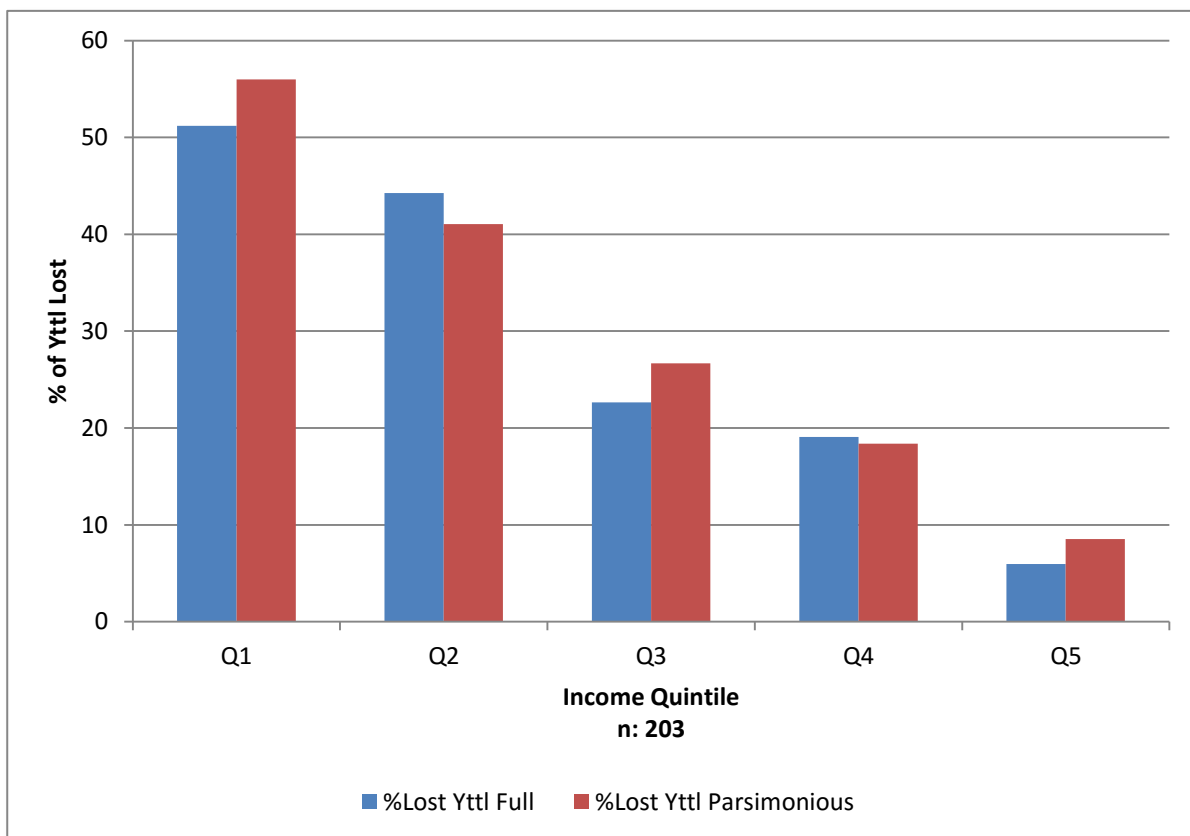
Figure 9: Total Household Income (Y_i^{ttl}) Lost Net of Compensation by Income Quintile (2012/2013)

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12 As explained above this does not include the income obtained through the FDP

Table 5:   Comparison of Compensatory Payments per Quintile

Quintile	Land Leased (acres)	% of total land leased	Y^{ll} (€)	Y^{ll} (€) per acre
1	65.5	47.6	218.5	3.34
2	142	62.6	494.3	3.48
3	170	61.7	1385.5	8.15
4	155.5	60.9	1388.4	8.93
5	236.5	58.3	5962.01	25.21

Table 5 above illustrates for each income quintile the number of acres leased, the percentage of total land leased to the project, the observed compensatory payments to each quintile and the average compensation per acre for each quintile. The wealthier households leased more land to the project than did the poorer households, 65.5 acres for the poorest 20% and 236.5 acres for the wealthiest 20%, but the poorer households received substantially less in per acre compensation, €3.34 per acre for the poorest 20% and €25.21 per acre for the wealthiest 20%. Comparing the land lease income received per quintile in table 5 to the results from section 6.3, a welfare neutral compensation of between €48.5/acre and €55.41/acre, it stands to reason that although all households in the sample fell short of the minimum compensation requirement, the project disproportionately favoured the wealthier households as compared to the poorer households through the applied compensation mechanism.

Figure 10 below shows the relative total household income (Y^{ttl}) lost net of the project's compensatory payments for non-landowning land using households, between 17% and 20% of total household income, as well as for land owning households, between 10% and 14%.
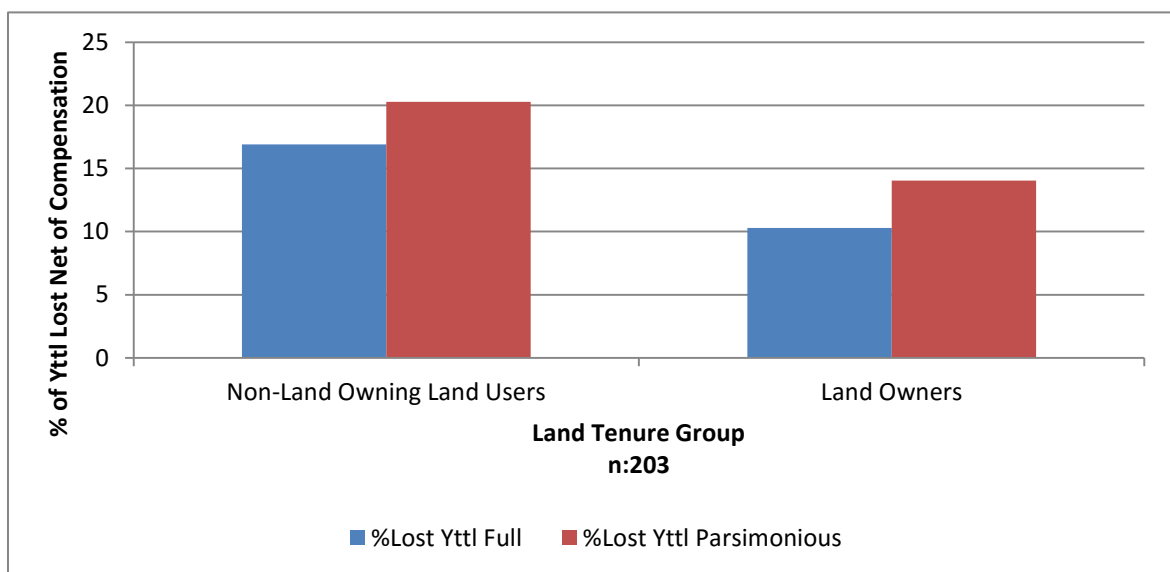
Figure 10: Total Household Income (Y^{ttl}) Lost Net of Compensation by Land Tenure Group (2012/2013)

Figure 10 shows a clear difference in household income lost between landowning and non-landowning land using. This is not surprising due to the fact that non-land owning land using households are not officially recognised by Sierra Leonean law as stakeholders in land lease agreements and thus not eligible for official compensation.

At this stage it is essential to mention that the project made annual compensatory payments in adherence to national laws and policies, US$5 (€3.91)/acre distributed amongst the defined stakeholders, and consequently can call itself fully compliant with regard to these policies. The project even went one step further and introduced Acknowledgement Agreements with the land owners to ensure these receive €2.5/acre instead of the legally prescribed €1.41/acre (cf. Table 1). Additionally the project was concerned about the impact of reduced agricultural land on food security and initiated the CSR programme in order to mitigate these effects; with the CSR programme the project also went beyond that which was legally required of them. Nonetheless the empirical results show that the level of compensation paid by the project was insufficient to cover the welfare losses suffered by the sample's households. Moreover the relative losses of income were significantly higher for poorer households than they were for the sample's wealthier households. This shows that also the distribution of the compensation, explained in chapter 3 as dictated by national policy, appears unfair considering the disproportionately greater negative impact on poorer farming households, as compared to more affluent land-owning households and traditional and modern government authorities.

7 Concluding Remarks

The recent proliferation of global large scale land leases and land acquisitions often attributed to the Food, Fuel, and Financial crisis of 2007/2008 has been accompanied by a surge in literature investigating the circumstances and effects of the activity often called land grabbing. Whilst the literature is extensive, covering topics ranging from institutional and legal setting to human rights issues and good practice guides for land grab, studies estimating the minimum rent required in order to compensate land using households for the loss of their agricultural land are missing. This paper fills this research gap and presents a theoretical and methodological framework which can be implemented both in an ex ante and an ex post situation and allows a land grabbing agent to define the minimum rent, or compensatory payment, which it needs to pay to prevent land using household from suffering a welfare loss and a reduction of their food security.

The theoretical framework presented here is based on a household income function, focusing specifically on the agricultural income. This allows for the rigorous estimation of the value of lost agricultural output by establishing a counterfactual in which the area of available land has been altered by the land lost due to the land lease for each household. Based on the assumption that a minimum compensation should result in the households, ceteris paribus, experiencing no welfare loss this paper has estimated that in this specific case, an adequate annual compensation for the land users who lost access to agricultural land should be on average between €48.5 and €55.41 for each acre lost due to the land grab.

Two major results emerge from the study, the first concerning the amount of the compensation paid by the project and the second concerning the legally prescribed distribution system of the compensation amongst the various stakeholders. The project paid the nationally prescribed €3.91/acre to the various stakeholders, which is substantially lower than the estimated value of the agricultural land, i.e. the agricultural income that farmers could have produced from cultivating this land themselves. The current situation in which the project affected households are suffering a considerable welfare loss directly attributable to the project could have been prevented had an impact study along the lines proposed in this paper been conducted ex ante. All that would have been required was an ex-ante survey among the affected land-using households to establish their net agricultural output per acre and thus determine an adequate annual compensation payment for the loss of farmland.

The distribution of compensatory payments defined by the legislation of Sierra Leone imperfectly captures the actual situation and counteracts local customary land use rights. The legal framework identifies four stakeholders and imbues in them the right to compensatory payments. These stakeholders are the national government, the district council, the chiefdom council, and the land owning family. In addition to identifying these four groups of stakeholders, national policy also defines the shares of the total compensatory payment to be received by each of the stakeholders (cf. Section 3.2). The project acknowledged the disparity of this system and established the acknowledgement agreements which significantly increased the share of the compensation received by the land owning families from 50% to 63.97%. However, this study found that 90% of the sampled households were not members of any of the four recognised stakeholder groups

but instead form a fifth group of stakeholders. These are the non-landowning land using households, which are not recognized as having land rights by formal policies (cf. MAFFS 2009, SLIEPA 2012), and are consequently excluded from the project's official compensatory payments. Nevertheless the landless land users have customary land use rights, and rely heavily on the land they cultivate for their food security. The popular recognition of customary land rights is reflected in the fact that the sampled households received €3.82/acre on average, even though most had no official rights to compensation. Additionally, the welfare loss of the non-landowning land using families was between 17% and 20% of total household income whereas that of landowning families was somewhat lower between 10% and 14%. Land ownership status aside, it was shown that the distribution of the actual received compensation was especially damaging to the sample's poorer households as the poorest 20% lost between 51% and 56% of their total household income due to the land grab whereas the wealthiest 20% lost between 6% and 9%. Increased attention to the household specific value of land lost to a land grab in combination with broader stakeholder identification could mitigate the negative impacts of land grabs and allow for the calculation of a minimum compensation which allows smallholder farmers to maintain their welfare level in case of a land grab.

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ANNEX 1: Household Questionnaire

RUHR UNIVERSITÄT BOCHUM — RUB

IEE — Institut für Entwicklungsforschung und Entwicklungspolitik — Institute of Development Research and Development Policy

ECONOMIC IMPACTS OF LARGE SCALE LEASES OF FARMLAND ON SMALLHOLDER FARMERS.

INTRODUCTION AND INFORMED CONSENT

Good Morning! My name is Mohamed Sorie Conteh. I am a Masters student from the Institute of Development Research and Development Policy, Ruhr University of Bochum, Germany. For my Master's thesis, I am currently conducting an academic research in 8 villages in the project's operational areas to assess the impacts of Large Scale Leases of Farmland on smallholder farmers. The information that you may provide will be kept strictly confidential and will be used for academic purpose only. It may take about 50 minutes to complete this questionnaire.

Would you like to participate?

Consent given: Yes ☐   ⇨   Continue

No ☐   ⇨   Go to next household

INSTRUCTIONS

This research targets farming households and therefore we interview heads of the households as the primary respondents. Write down the response clearly where appropriate; otherwise circle the code(s) of the appropriate option(s.).

Household Location

Household number: |___|___|

District: _____

Chiefdom: _____   Section: _____

Enumerator's name: _____   Interview date: _____

Section A: Household Information

1. Name of respondent (household head): _____

2. Gender: Male --------- 1   Female --------- 2

3. Age in completed years: _____

4. Can you read and write?

                             Yes --------- 1   No --------- 2

5. What is your highest level of

No education --------------- 1	Tech/Voc -------------------- 4
Primary school ------------- 2	Tertiary/Polytechnic ------
Secondary school --------- 3	

6. How many people live in this household, including you (that is, resident members)?   _____

7. Of the people that live in this household, how many are of the following age groups?

   a. Adults (18 years & above):   Male _____   Female _____   Total _____

   b. Children (10–17 yrs):   Male _____   Female _____   Total _____

   c. Children (below 10 yrs):   Male _____   Female _____   Total _____

Section B: Farmland Holding and Leasing

8. What is the total size of land that you/your household have been farming on over the past 5 years (i.e. *since 2008)?* _____*acres*

9. Of the farmland you have been farming in the past 5 years, what is the size of each of the following types? Write zero if none

   a. Upland: _____*acres*

   b. Lowland/Boliland: _____*acres*

   c. IVS: _____*acres*

10. Have you/your household leased any of farmland to the project?

Yes, leased all farmland	 1	
Yes, leased part of farmland	 2	
No, none of farmland is leased	 3	*If No, Go to Section C*

11. If leased all or part of farmland, what is the total farmland that have been leased?

_____ *Acres*

12. Of the total farmland leased what is the size of each type mentioned in Qu. 9?

      a. Upland: _____ acre

      b. Lowland/Boliland: _____ acres

      c. IVS: _____ acres

13. For how many years has the farmland been leased?

1 year ago	 1	4 years ago	 4
2 years ago	 2	5 years ago	 5
3 years ago	 3		

14. After the land was/has been leased, have you been farming on it?

Yes 1   No 2   ***If No, Go to Qu. 16***

15. For how long have you farmed on the land after leasing?

1 year	 1	4 years	 4
2 years	 2	5 years	5
3 years	 3		

16. Having leased the farmland, how do you/any member of this household make use of the saved farm labour?

    Choose all that apply

Engage in petty trading	 1
Doing casual labour	 2
Charcoal burning	 3
Leisure	 4
Others (specify)	.... 5 _____

17. Who takes decision over the lease of the farmland you/your household was working on? *(i.e. the main decision maker)*

> Household head 1
>
> Spouse 2
>
> Land owners 3
>
> Chiefs 4
>
> Others (specify) .... 5 _____

Section C: Farming Systems, Inputs and Agricultural Production

18. What type of farming system that your/your household are practicing now?

> Intensive cultivation only 1
>
> Shifting cultivation only .... 2 → *Go to Qu. 20*
>
> Both intensive & shifting 3

19. If you are practicing intensive cultivation, what are the reason(s) for that?

> *Choose all that apply*
>
> Leased most of farmland 1
>
> Cattle grazing 2
>
> Land dispute 3
>
> Non-availability of arable land 4
>
> Others (specify) .... 5 _____

20. Did you cultivate any farmland in the last farming season (year)?

> Yes 1   No 2   → *If No, Go to Qu. 27*

21. How many acres of all farms did you cultivate in last farming season (year)?

> _____ *acres*

22. Did you practice both shifting and intensive cultivation in the last farming season (year)?

> Yes 1   No 2   → *If No, Go to Qu. 25*

23. How many acres did you cultivate?

> a. Shifting cultivation: _____ *acres*
>
> b. Intensive cultivation: _____ *acres*

24. If yes, how much did you pay for the following inputs?

Inputs	(i) Costs of shifting cultivation (in leones)	(ii) Costs of intensive cultivation (in leones)
a. Seeds/seedlings		
b. Labour		
c. Farm tools		
d. Fertilizer/other chemicals		
e. Rent/Royalty		
f. f. Others (specify)		
g. Total cost		

25. Please give an estimate of the value of the crops that you or your household produced in the last farming season (year)

Crop	(i) Unit	(ii) Quantity sold	(iii) Price per unit	(iv) Total sales (in leones)
a. Rice (polished)				
b. Rice (husk)				
c. Cassava				
d. Potatoes				
e. Maize (raw)				
f. Maize (dried seed)				
g. G/nuts (shelled)				
h. G/nuts (unshelled)				
i. Vegetables				
j. Other (specify)				
k. Grand Total (sales)				

26. Did you/your household sell any of the crop(s) referred to in question 25?

Yes 1   No 2   → *If No, Go to Qu. 28*

27. If yes, how much of these crops were sold in the last farming season (year)?

Crop	(i) Unit	(ii) Quantity sold	(iii) Price per unit	(iv) Total sales (in leones)
a. Rice (polished)				
b. Rice (husk)				
c. Cassava				
d. Potatoes				
e. Maize (raw)				
f. Maize (dried seed)				
g. G/nuts (shelled)				
h. G/nuts (unshelled)				
i. Vegetables				
j. Other (specify)				
k. Grand Total (sales)				

28. Please estimate of the monetary value of palm tree products that you/your household produced in the last farming season

Product	(i) Unit	(ii) Quantity sold	(iii) Price per unit	(iv) Total sales (in leones)
a. Palm Oil				
b. Palm Wine				
c. Palm Kernel Nut				
d. Palm Kernel Oil				
e. Other palm product				
f. Other palm product				
g. Grand Total (sales)				

29. Did you/your household sell any product(s) from palm tree in last farming season (year)?

Yes 1   No 2   → *If No, Go to Qu. 31*

30. If yes, how much of palm tree products were sold in the last farming season (year)?

Product	(i) Unit	(ii) Quantity sold	(iii) Price per unit	(iv) Total sales (in leones)
a. Palm Oil				
b. Palm Wine				
c. Palm Kernel Nut				
d. Palm Kernel Oil				
e. Other palm product (specify) _____				
f. Grand Total (sales)				

31. Please estimate the cost of inputs required to produce these crops and/or produce from palm trees in the last farming season (year) *(refer to questions 25 & 28)*.

Input	(i) Unit	(ii) Quantity	(iii) Unit cost (in leones)	(iv) Total cost (in leones)
a. Seeds				
b. Seedlings				
b. Labour (man days)				
c. Farm tools				
d. Fertilizer/other				
e. Rent/Royalty				
f. Others (specify)				
g. **Grand Total (cost)**				

Section D: Farmer Development Programme

32. Have you/your household ever benefited from the FDP (Farmers Development Programme) ?

       Yes 1   No 2   → *If No, Go to Qu. 35*

33. How many years have you/ your household benefited from the FDP?

       1 year   1   3 years   3

       2 years   2   4 years   4

34. Did you/your household benefit from the FDP in the last farming season(year)?

    35. What was the total yield (in bushels) from the FDP?   _____*bushels*

    36. How many bushels did you pay for the FDP?   _____

    37. Did you/any member of this household receive any wage for labour in the last farming season (year)?

        Yes 1   No 2

        Yes 1   No 2   → *If No, Go to Qu. 35*

Section E: Household Income and Expenditure

    38. Please estimate the total income of your household from the different income sources in the past year:

        a. Income from land lease: Le _____

        b. Income from payment for economic trees (e.g. Palm Trees):   Le _____

        c. Income from sales of Palm Tree products: Le _____

        d. Income from own farm (sales of crops):   Le _____

        e. Income from FDP (Net):   Le _____

        f. Income from wage labour: Le _____

        g. Remittances: Le _____

        h. Other income sources (specify): _____Le _____

    39. Please estimate you/your household expenditure in respect of the following in the past year.

        a. Food: Le _____

        b. Education: Le _____

        c. Health: Le _____

        d. Fuel/Wood: Le _____

        e. Local house construction materials: Le _____

END! THANK YOU