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The Political Economy of Large-Scale Land Acquisition in Sierra Leone: An Empirical Application of a Computable General Political Economy Equilibrium Modelling Approach

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Contents

List of Figures

List of Tables

Dedication

In token of my love and gratitude, this work is dedicated to my mum Anita, my wife Daniella and my daughter Edmonda.

Acknowledgement

In the process of completing this thesis, I owe so much gratitude to a number of my friends and colleagues for their prayers, support and inspiration. I want to start by thanking God for giving me the strength to complete this journey. It is only by His grace and magnanimity that I have been able to come this far. I also want to express my appreciation to the German Federal Ministry of Education and Research (BMBF), through the Evangelisches Studienwerk Villigst fellowship, for funding my studies.

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But they that wait upon the LORD shall renew their strength; they shall mount up with wings as eagles; they shall run, and not be weary; and they shall walk, and not faint. (Isaiah 40:31)

Abstract

The transfer of large areas of agricultural land from small-holder farmers to international investors, particularly in Sub-Saharan Africa, has become one of the most hotly debated topics in the international development arena. Since investors tend to compete for land with local farming communities who do not have formal land ownership rights, these acquisitions have sometimes resulted in forced evictions and have been infamously referred to as "land grabbing" in some quarters. Even though there is a broad agreement among both critics and proponents that this new wave of land transfers have profound welfare implications, there is a dearth in the academic literature about their distributional and welfare effects at both the household and country level. Moreover, beyond pure economic factors, political economy analyses of large-scale land acquisition have rarely been provided.

This dissertation attempts to fill this gap by adopting a Computable General Political Economy Equilibrium (CGPE) modelling approach to undertake an empirical political economy analysis of the role of political preferences, policy beliefs and political power in the large-scale land acquisition policy process in Sierra Leone. It also undertakes a quantitative assessment of the distributional and welfare effects of large-scale land acquisition at both the household and country level.

The dissertation is a collection of four essays. In the first essay, we employ the Mean Voters model to quantitatively evaluate the power of communication and the exchange of expert information in the land reform policy formulation process. Our analysis demonstrates that exchange of expert information within Sierra Leone land reform policy domain leads to consensus building. Political agents are willing to give up some of their political decision making power over final policy choice to non-political actors like donors and other interest groups in exchange for expert information about how policies translate into outcomes. In the second essay, we explore the network generating process and the underlying factors that drive land reform policy processes using network-based approach and a Bayesian model of Exponential Random Models (ERGM). Our results indicate that policy networks are not entirely driven by stakeholder organisations need for information to form and update their policy beliefs, but also by personal organizational attributes, policy preferences and beliefs, and network structures. In the third essay, we examine the welfare implications of imperfect land and labour markets on land transfers using an integrated modelling approach that incorporates a land and labour market module and a micro-simulation poverty module into a Computable General Equilibrium model. Our main findings suggest that moderately reducing transaction costs through reforming land laws and customary land governance practices in Sierra Leone's land market could considerable enhance economic growth and the welfare of its small-holder farmers. In the fourth essay, we develop an extended farm household model (FHM) to analyse the effects of transaction costs on the welfare of different socio-economic groups based on the policy beliefs and incentives of stakeholders and farm households. Our main results show that even though some stakeholders are captured by large-scale farmers, i.e. they put an extremely high political weight on

large-scale farm profits, land market policy is not driven by land grabber preferences. Also, land market policies would be only significantly inefficient if small-scale farmers hold rational expectation beliefs. Moreover, comparing relative welfare levels achieved assuming bias and unbiased political interest reveals that incentives biases are generally almost negligible.

These findings have significant implications for development institutions and donor organisations seeking to promote stakeholder engagement and bolster evidence-based policy making in developing countries like Sierra Leone. As our findings demonstrate, donor organisations are often right to form coalitions with the executive branch of government to achieve policy reforms. However, real political influence resides in the hands of few players in these political systems. Thus, there is a risk that the subsequent bottom-up policy driven formulation processes will result in the desired policy priorities of less influential groups being completely ignored. Therefore, conscious efforts must be made to include less powerful groups in the policy making process and ensure that their voices and policy priorities are given due consideration. Finally, we posit that the wide variance in the estimated policy beliefs among stakeholder organisations, particularly between the donor community and the executive branch of government- two of the most powerful group of stakeholders in the policy network - could result in the choice of inefficient policies. Hence, we suggest a trans-disciplinary research approach that allows for the scientific and political community to interact and narrow these policy belief differences.

Zusammenfassung

Land Grabbing, d.h. der Transfer landwirtschaftlicher Flächen von kleinbäuerlichen Betrieben zu landwirtschaftlichen Großbetrieben, die von internationalen Investorengruppen finanziert werden, ist ein aktuelles Phänomen, das in vielen Entwicklungsländern, insbesondere in Afrika südlich der Sahara, zunehmend beobachtet wird und sehr kritisch auf politischer und wissenschaftlicher Ebene diskutiert wird. Kritisiert wird an diesen Landtransfers im großen Stil, dass in den Entwicklungsländern formale marktwirtschaftliche Institutionen, wie Eigentumsrechte und Informationssysteme, oft nur schwach entwickelt sind, so dass diese Landtransfers nicht effizienten Markttransaktionen entsprechen, sondern eher eine erzwungene Transaktion zum Nachteil der Kleinbauern und oft auch der Umwelt darstellen. Allerdings wird der Effekt dieser Landtransfers auf die gesamte wirtschaftliche Entwicklung wie auch die Wohlfahrt der Kleinbauern durchaus auch kontrovers diskutiert. Dabei wird u.a. auf die deutlich höhere Produktivität der Großbetriebe im Vergleich zu den traditionell wirtschaftenden Kleinbetrieben hingewiesen, wodurch Landtransfers zu einer Realisierung von erheblichen Effizienzsteigerungen und damit verbunden positiven Wachstumsimpulsen und Beschäftigungseffekten gerade auch im ländlichen Raum führen können. Insofern sind grundsätzlich weder die gesamtwirtschaftlichen Wohlfahrtswirkungen noch die Wohlfahrtswirkungen der Landtransfers auf die Kleinbauern offensichtlich, sondern hängen von den konkreten ökonomisch-ökologischen Bedingungen eines Landes ab. Darüber hinaus wird Land Grabbing in der Regel mit einem Regierungsversagen verbunden, d.h. internationale Investorengruppen beeinflussen nationale Regierungen, entsprechende Landtransfers durch geeignet politische Maßnahmen, wie die Zulassung von Landbesitz von Ausländer, zu erleichtern bzw. überhaupt erst zu ermöglichen. Insofern ist es interessant über rein wirtschaftliche Faktoren hinaus, den zugrundliegenden polit-ökonomischen Prozess von potentiellem Land Grabbing zu analysieren. Konkret soll dabei auf zwei Forschungsfragen eingegangen werden. Erstens, inwieweit stellt die Landreform, die ein Landtransfer von Kleinbauern zu internationalen Großbetrieben ermöglicht bzw. erleichtert, tatsächlich ein Politikversagen dar, d.h. diese reduziert die soziale Wohlfahrt eines Landes. Zweitens, inwieweit ist dieses Politikversagen auf verzerrte politische Anreizstrukturen, d.h. Lobbyingaktivtäten der internationalen Investoren auf Kosten der heimischen Bevölkerung zurückzuführen, bzw. ist dies auf verzerrte politische Vorstellungen der Regierungen hinsichtlich der Wirkung der eingeführten Landreformen zurückzuführen. Im Gegensatz zu verzerrten politischen Anreizstrukturen impliziert Politikversagen aufgrund verzerrter Policy Beliefs, dass Regierungen grundsätzlich an der Maximierung der Wohlfahrt ihrer Bevölkerung interessiert sind, aber ihnen die notwendigen ökonomisch-technischen Kenntnisse fehlen, die richtigen Politiken zu formulieren. Diese Unterscheidung in Politikversagen aufgrund von verzerrten Anreizen oder aber fehlendem politischen Fachwissen ist nicht trivial, da eine Vermeidung des Politikversagens im ersten Fall komplett andere Strategien erfordert als im zweiten Fall. In diesem Zusammenhang versucht die Dissertation einen Beitrag zum besseren Verständnis der politischen Ökonomie des Phänomens Land Grabbing zu leisten. Konkret wird ein CGPE- Modellansatz (Computable General Political Economy Equilibrium) anwendet, um eine empiri-

sche Analyse des Land Grabbing Phänomens in Sierra Leone durchzuführen. Konkret beinhaltet der CGPE-Ansatz eine simultane Modellierung der ökonomischen Implikationen der Landtransfers von Kleinbauern an Großbetriebe sowie eine Modellierung des politischen Entscheidungsprozesses aktueller Landreformpolitiken im Rahmen des CAADP-Plans. Hierbei wurden einerseits ein angewandtes generelles Gleichgewichtsmodell für Sierra Leone erstellt. Andererseits wurde ein eigener Politiknetzwerk-Survey durchgeführt, in dem die relevanten Stakeholder identifiziert wurden und deren jeweiligen politischer Präferenzen, politischer Überzeugungen und politischer Netzwerkbeziehungen erhoben wurden. Auf der Grundlage der erhobenen Daten konnte ein CGPE-Modell spezifiziert werden. Weiterhin konnte der politische Einfluss und die Politischen Beliefs relevanter Stakeholder ökonometrisch geschätzt werden. Abschließend konnten auf der Grundlage des spezifizierten CGPE-Ansatzes die jeweiligen politischen Entscheidungen hinsichtlich der Landreformpolitiken für unterschiedliche politische Anreizstrukturen und Politische Beliefs der relevanten Stakeholder simuliert werden und deren jeweiligen Verteilungs- und Wohlfahrtseffekte berechnet werden. Diese Simulationen lassen unmittelbare Rückschlüsse zu, inwieweit aktuelle Landreformpolitiken in Sierra Leone tatsächlich ein Politikversagen in Form von Land Grabbing darstellen.

Die Dissertation ist eine Sammlung von vier Aufsätzen. Im ersten Aufsatz verwenden wir das Mean Voter-Theorem, um die Kommunikationskraft und den Informationsaustausch von Experten im Formulierungsprozess der Landreformpolitik quantitativ zu bewerten. Unsere Analyse zeigt, dass der Austausch von Experteninformationen im Bereich der Landreformpolitik in Sierra Leone zur Konsensbildung führt. Politische Akteure sind bereit, einen Teil ihrer politischen Entscheidungsbefugnis über die endgültige politische Entscheidung an unpolitische Akteure wie Geber und andere Interessengruppen abzugeben, um Experteninformationen über politische Maßnahmen zu erhalten, die sich in Ergebnissen niederschlagen. Im zweiten Aufsatz untersuchen wir den Netzwerkgenerierungsprozess und die zugrunde liegenden Faktoren, die die Prozesse der Landreformpolitik vorantreiben, mithilfe eines netzwerkbasierten Ansatzes und eines Bayes'schen Modells exponentieller Zufallsmodelle (ERGM). Unsere Ergebnisse zeigen, dass Richtliniennetzwerke nicht ausschließlich von Interessengruppen bestimmt werden, die Informationen benötigen, um ihre Richtlinienüberzeugungen zu formulieren und zu aktualisieren, sondern auch von persönlichen Organisationsattributen, Richtlinienpräferenzen und -überzeugungen sowie Netzwerkstrukturen. Im dritten Aufsatz untersuchen wir die Wohlfahrtsauswirkungen unvollkommener Land- und Arbeitsmärkte auf Landtransfers mithilfe eines integrierten Modellierungsansatzes, der ein Land- und Arbeitsmarktmodul und ein Mikrosimulations-Armutsmodul in ein berechenbares allgemeines Gleichgewichtsmodell integriert. Unsere wichtigsten Ergebnisse deuten darauf hin, dass eine moderate Reduzierung der Transaktionskosten durch die Reform der Landgesetze und der üblichen Landverwaltungspraktiken auf dem Landmarkt in Sierra Leone das Wirtschaftswachstum und das Wohlergehen der Kleinbauern erheblich verbessern könnte. Im vierten Aufsatz entwickeln wir ein erweitertes Modell für landwirtschaftliche Haushalte (FHM), um die Auswirkungen der Transaktionskosten auf das Wohlergehen verschiedener sozioökonomischer Gruppen auf der Grundlage der

politischen Überzeugungen und Anreize von Interessengruppen und landwirtschaftlichen Haushalten zu analysieren. Unsere Hauptergebnisse zeigen, dass, obwohl einige Stakeholder von Großbauern erfasst werden, d. H. Sie den landwirtschaftlichen Großgewinnen ein extrem hohes politisches Gewicht beimessen, die Landmarktpolitik nicht von den Präferenzen der Landräuber bestimmt wird. Außerdem wäre die Landmarktpolitik nur dann erheblich ineffizient, wenn Kleinbauern rationale Erwartungen vertreten würden. Darüber hinaus zeigt der Vergleich des relativen Wohlfahrtsniveaus, das unter der Annahme von Voreingenommenheit und unvoreingenommenem politischem Interesse erreicht wurde, dass Anreizverzerrungen im Allgemeinen nahezu vernachlässigbar sind.

Diese Ergebnisse haben erhebliche Auswirkungen auf Entwicklungsinstitutionen und Geberorganisationen, die das Engagement der Stakeholder fördern und die evidenzbasierte Politikgestaltung in Entwicklungsländern wie Sierra Leone unterstützen möchten. Während Geberorganisationen häufig zu Recht Koalitionen mit der Exekutive der Regierung bilden, um politische Reformen zu erreichen, liegt, wie unsere Ergebnisse zeigen, der wirkliche politische Einfluss in den Händen weniger Akteure in diesen politischen Systemen, besteht das Risiko, dass das anschließende Bottomup erfolgt politikgetriebene Formulierungsprozesse führen dazu, dass die gewünschten politischen Prioritäten weniger einflussreicher Gruppen nicht das Licht der Welt erblicken. Daher müssen bewusste Anstrengungen unternommen werden, um sicherzustellen, dass die Einbeziehung weniger mächtiger Gruppen in den politischen Entscheidungsprozess nicht als „Schaufensterdekoration“ angesehen wird, sondern um sicherzustellen, dass ihre Stimmen und politischen Prioritäten gebührend berücksichtigt werden. Schließlich gehen wir davon aus, dass die große Varianz der geschätzten politischen Überzeugungen unter den politischen Akteuren, insbesondere zwischen der Gebergemeinschaft und der Exekutive der Regierung - zwei der mächtigsten Gruppen von Interessengruppen im politischen Netzwerk - zur Wahl ineffizienter politischer Maßnahmen führen könnte. Daher schlagen wir einen transdisziplinären Forschungsansatz vor, der es der wissenschaftlichen und politischen Gemeinschaft ermöglicht, diese politischen Glaubensunterschiede zu interagieren und zu verringern.

Chapter 1
Introduction

The transfer of large areas of agricultural land from small holder farmers to international investors in the developing world has become one of the most contested issues in global development (German *et al.*, 2013; Mann and Bonanomi, 2017; Daniel and Mittal, 2009). Byerlee and Deininger (2011) estimate that between October 2008 and August 2009, 46.6 million hectares of arable were acquired globally. A further 56.6 million hectares - amounting to two-thirds of all land acquired- were leased to large-scale land investors in Sub-Saharan Africa (SSA) between 2008 and 2010. Contrary to claims that the continent has a huge reservoir of idle land waiting to be put to good use, empirical evidence suggests that small-holder farmers mostly compete with large-scale investors and there is, in fact, no surplus of agricultural land (Anseeuw *et al.*, 2011; De Schutter, 2011; Lavers, 2012). While there is an increasing interest in understanding how these acquisitions affect the rural poor, the growing literature on large-scale land acquisition (LaSLA) has so far largely focused on examining the sheer scale and speed of these new wave of acquisition (BBC, 2012; Edelman, 2013; Oya, 2013), their drivers (Borras *et al.*, 2011; Cotula, 2012; Margulis *et al.*, 2013), and their livelihood and gender dimensions (Daley and Pallas, 2013; Margulis *et al.*, 2013; Ryan, 2018; Tsikata and Yaro, 2013; Verma, 2014). Even though preliminary evidence suggests that land transfers have profound welfare implications (Arndt *et al.*, 2010; Bottazzi *et al.*, 2018; Kleemann and Thiele, 2015), because many of the land investment projects are still in their infancy, the extent and severity of their welfare implication are still being progressively investigated. As a result, to date, quantitative evidence about the implications of these acquisitions on small-holder farmers and their households are still scanty. Moreover, at the theoretical level, the welfare effects of land acquisitions on rural population at the community and economy-wide level remains ambiguous (see e.g. Kleemann and Thiele, 2015).

That these investments remain concentrated in regions where governance structures are weak, and land rights largely informal and undocumented have added a layer of complexity to the land acquisition processes (Anseeuw, 2013; Bottazzi *et al.*,

2016; Bruce and Migot-Adholla, 1994; De Schutter, 2015). In the absence of secure property regimes to lay claim to the land that they occupy, competition between large-scale investors and local land users have resulted in forced evictions of the latter. Many critics have since infamously characterised these displacements as "land grabbing" (Borras and Franco, 2013; Daniel and Mittal, 2009; GRAIN, 2008; La Via Campesina., 2011). Even before this new wave of land acquisition commenced, there was already a huge body of evidence which indicate that the absence of formal, documented and secure property right regimes contribute to dysfunctional and imperfect factor markets (Besley and Ghatak, 2010; Colin and Woodhouse, 2010; Deininger and Feder, 2001; Dillon and Barrett, 2017). Such market imperfections have been consistently identified as one of the factors that ultimately result in high transaction costs and impede the smooth and efficient exchange of land among users. Nevertheless, most of the studies that have attempted to examine the welfare effects of these land transfers completely ignore the factor market imperfections that continue to persist in most of the countries in Sub-Saharan Africa where large-scale land acquisition is prominent. But do imperfect factor markets significantly affect both the efficiency and distributional effect of these large-scale land transfers? Will a more formalized property right regime reduce the transaction costs associated with these land transfers and lead to a more efficient land acquisition process? If yes, will it have any welfare effect(s) at the household or country level? These questions remain largely unanswered in the emerging and growing literature on large-scale land acquisition.

Beyond pure economic factors, political economy analysis of large-scale land acquisition has rarely been provided. There is a limited examination of the political context within which these acquisitions take place. Given the important role political institutions play in the choice and implementation of, agricultural and land policies, a purely welfare centric and economic approach to analysing land transfers is clearly inadequate to understand the factors that determine the choice of these policies. From a political economy perspective, it will be interesting to understand whether national governments promote land acquisition policies because they believe that the transformations they usher in will promote technical progress and growth in the economy, or because they are captured by particular interest groups of foreign investors or local large-scale farmers whose interest they seek at the expense of the general public interests. These issues speak to the importance of complementing economic analysis of large-scale land acquisition with political economy perspectives.

Additionally, most of the literature so far on this topic adopt a simple dichotomous

portrayal of the actors involved in the large-scale land acquisition process. On the one hand, there are proponents, who are generally depicted as being in favour of the transfer of land from local users to foreign investors even when it is at the detriment of small-holder farmers and other marginalized groups (Boamah, 2011; Byerlee and Deininger, 2011; Food and Agriculture Organization of the United Nations, 2012). On the other hand, there are activists and supporters, who are depicted as advocates for the existence of secure land property rights- and by extension the livelihood- of small-holder farmers and the marginalized in society (De Schutter, 2015; FIAN, 2010; Lavers, 2012). However, this dichotomy can be sometimes simplistic and problematic because support for, or opposition to, large-scale land acquisition is sometimes complex and not so clear cut. A government official and a farmer organisation, for instance, might both have a policy preference of reducing poverty, increasing agricultural productivity and income of small-holder farmers but hold different views and policy beliefs about how these preferences can be achieved. The former might believe that the best way to achieve these goals will be to have large-scale farmers and investors take over land and increase production and reduce prices through mechanised farming. The large-scale farmer, could achieve all this while employing small-scale farmers on their farms to pass on modern farming techniques. The latter might however hold the belief that the best way to achieve such a goal is not to have large transfer of land investors, but instead through government investment in the agricultural sector and improving the efficiency and productivity of small-scale farmers. In such a circumstance, both set of actors might be in favour of, or opposed to, large-scale land acquisition because of different beliefs about how policies translate into outcomes even though they have the same policy preferences. This underscores the significance of policy beliefs and political incentives in examining the drivers of policy choice.

In relation to political economy perspectives, while the so-called land grabbing literature has given very little consideration to the role of policy beliefs in the choice of large-scale land acquisition policies, previous studies of agricultural related policy processes have illustrated the importance of policy beliefs and policy incentives in the choice of certain policy option (Bischoff and Siemers., 2011; Krueger *et al.*, 1991; Walstad, 1996). For instance, Caplan (2001, 2007) contend that because of the complex relationship between policy goals and their implied political outcomes, policy makers rely on naive mental models, also known as policy beliefs, to simplify these complexities. However, he opines that, due to intellectual and cognitive limitations, the mental model of all stakeholders involved in the policy formulation process are far from perfect and hence they do not fully understand the true relationship be-

tween specific policy instruments and their impact on the state of the world. Also, since policy beliefs are largely based on actors pre-existing knowledge about the perceived impact of policies in the real world, it implies that different actors hold different policy beliefs. The policy belief of experts, for example, is expected to be more sophisticated than that held by laymen, ordinary voters or even political agents (Akerlof, 1989; Blendon *et al.*, 1997). If voters, for instance, elect a leader who holds a bias policy belief, it could result in the choice and implementation of inefficient policy options. Also, in instances where politician turn to policy experts for advice, their policy beliefs might also influence final policy choice. Henning *et al.* (2019) found that informational exchanges among politicians, legislators, policy experts and international donor organisations proved to be a strong policy influence mechanism in the Comprehensive African Agricultural Development Program (CAADAP) in Sub Saharan Africa. All of these imply that policy beliefs have an important role to play in the choice of final political decisions.

In regards to policy processes that result in the choice of and implementation of large-scale land acquisition policies, early reports about the exclusion of land-owners and users by local elite during negotiations (Anseeuw *et al.*, 2013; Die Zeit, 2012; De Schutter, 2015; Razavi, 2003), and the widespread local and international protestations against the forceful eviction of land users (Reuters, 2011) has led to the promotion of inclusive policy instruments that favour stakeholder engagements by international development organisations like the United Nations Food and Agricultural Organization, the United Nations Framework Convention on Climate Change (UNFCCC) and the World Bank. These instruments include, among others, the voluntary guidelines on the Principles for Responsible Agricultural Investment; the Principles for Responsible Investment in Agriculture and Food Systems and; the Voluntary Guidelines on the Responsible Governance of Tenure (Committee on World Food Security, 2014; Food and Agriculture Organization of the United Nations, 2014; Seufert, 2013). The donor community and international organisations have promoted these soft law instruments in part to facilitate stakeholder engagements, increase knowledge and information sharing about policies, encourage free and informed consent in the land acquisition process and ensure that there is some form of local ownership in communities where large-scale land acquisition is prevalent (Tzouvala, 2019; Food and Agriculture Organization of the United Nations, 2014; Paoloni and Onorati, 2014; Perdana, 2018). Given that participatory stakeholder engagements have been lauded as an exemplary grass-root governance and decision-making tool in development politics (Chambers, 2007; Ghaye *et al.*, 2008; Malkamäki *et al.*, 2019; Reed, 2008), an evaluation of such a policy process could provide gov-

ernments and development partners with empirical evidence about their influence on the choice of better policy arrangements.

Furthermore, despite the growing body of evidence about the negative effects of large-scale land acquisition on rural livelihoods (Daley and Pallas, 2013; Daniel and Mittal, 2009; Deininger and Xia, 2016; Lisk, 2013), to the best of my knowledge, there is currently no study that has empirically accessed the policy processes that leads to the choice of these policies and the role political institutions and various stakeholders play in the process formulation process. Policy Network approach similar to those employed by Henning *et al.* (2018b) and Pappi *et al.* (1995) to assess the legislative decision-making in the European Union and stakeholder influence in agricultural policy formulation in Africa respectively, offer a promising methodological approach to evaluating participatory policy processes that promote stakeholder engagements. To this end, this dissertation attempts to answer the following political economy questions about large-scale land acquisition in Sierra Leone using a policy network approach:

1. What is the quantitative impact of formal and informal political institutions on the choice of large-scale land acquisition policies?
2. What is the role of expert communications and stakeholder engagements in the policy formulation process?
3. How and to what extent do political institutions influence large-scale land acquisition policy under different institutional arrangements?
4. What are the key factors that determine land reform policy processes in the study area?

The focus of our research, Sierra Leone, makes for a particularly interesting case study for several reasons. First, with the country being among the top ten early destinations of large-scale land investors (The Land Matrix Global Observatory, 2013), the activities of most of the early investments have sufficiently progressed to allow for an examination of their economic impacts at the household, community and economy-wide level. However, to date, except for few studies (Bottazzi *et al.*, 2018; Lakoh *et al.*, 2016), there is very little quantitative assessment of the welfare effects and implications of large-scale land acquisition at the household and virtually none at the national level in the country. Additionally, as sections of local farmers and other land users in Sierra Leone continue to protest and resist forced eviction

from land acquired by large-scale farmers in some of the major land acquisition projects (FIAN International, 2016; Oakland Institute, 2012; Reuters Africa, 2016), the country is one of the classical examples of the so-called "land grabbing" case. Lastly, as Tzouvala (2019) contends, Sierra Leone has become a "postal child" for the promotion and implementation of voluntary regulatory land grabbing instruments that promote stakeholder engagements and participatory policy processes. To the best of my knowledge, given that political economy analysis of these stakeholder engagement processes remain scanty, this research attempts to fill this gap by undertaking a quantitative assessment of the policy processes that results in the choice of these policies.

This dissertation makes several important contributions to the literature on large-scale land acquisition. First, it identifies key factors that determine the choice of large-scale land acquisition processes in Sierra Leone and quantitatively assesses the impact of different formal and informal political institutions on the land reform policy process in the country. Also, it provides new insights into how transaction costs, arising from customary land practice, and biased policy beliefs affect land transfer decisions. Additionally, by quantifying the effects of land transfers on food security, income levels and inequality, it provides further insights into how tenure insecurity affects land-related investments. In Sierra Leone, as is the case in most of SSA, where most of the rural poor depend on the agricultural sector for their livelihood, a realignment of one of the principal factors of production, that is land, is bound to have both local and economy-wide implications. An empirical evaluation of the policy processes and economic welfare implications of large-scale land acquisition is quite useful for future policy formulation and in deciding whether to scale up or abandon such a policy choice.

The rest of this chapter is structured as follows: the next section will provide a brief overview of the literature on political economy approaches of policy analysis in the agricultural sector in developing countries and identify gaps inherent in these approaches. It will be followed by a presentation of the theoretical framework that will guide this research. The chapter concludes with a summary of the four papers that make up this dissertation.

Political Economy approaches to analysing agricultural policy processes

Economists and Political Scientist have used different approaches to identify the factors that determine agricultural policy processes in developing countries. Early approaches were mostly qualitative in nature and fall within two main spectra; society and state-centred approaches. Society centred approaches depict the policy formulation process as one in which policies are influenced through lobbying by interest groups on behalf of their constituencies. This was typified by urban and rural interest groups attempt to influence the policy making process in favour of their constituency in the 1980s. Bates (1981) and DeJanvry (1981) both concluded that an urban bias in economic policy became entrenched in the policy formulation process primarily because of the inability of small-holder farmers to overcome the collective action problem and organise themselves into a potent pressure group.

The second category, state-centred approaches, represents the policy formulation process as one in which political decisions are entirely driven by the capacity of state actors to determine policy choices, independent of pressures and demands from private entities. The neo-patrimonialism hypothesis of Van de Walle (2003), which emphasises the role of the presidentialism and clientelism in explaining inefficient policy choices in the developing world, is one such state-centric approach. Along the same continuum, Boone (2003) also highlights the role played by local social structures in determining policy choices. Lastly, Krueger *et al.* (1991)'s cross country study of policy processes identifies several factors that explain the persistence of inefficient policy choices. These factors, among others, include policy beliefs, implementation challenges and path dependency issues.

In addition to qualitative approaches, there is also a substantial body of quantitative literature that examines agricultural policy formulation in the developing world. To understand the key factors that drive political decisions, quantitative approaches mainly focus on assessing specific characteristics of the political decision–making process (Peltzman, 1976; Becker, 1983; Krueger *et al.*, 1988; Swinnen, 1994; Tyers and Anderson, 1992; Miller, 1991; Zusman, 1976; Gardner, 1987). In particular, these studies characterize the agricultural policy-making process as the outcome of a political bargaining process among social groups about how wealth should be redistributed among different social groups within a country. Empirical evidence from these studies largely conclude that final policy decision about wealth redistribution among the populace is determined by the relative bargaining power of agricultural and non-agricultural groups and the economically determined trans-

formation of wealth among these groups.

One of the prominent contributions of quantitative literature is the interest group theory, a body of work based on contributions mainly from Peltzman (1976) and Becker (1983). Interest group models characterize the policy formulation process as a bargaining process among different interest that represent the political interest of competing social groups. In Sub-Saharan Africa for instance, lobbying activities by powerful interest groups are commonly identified as one of the sources of inefficient agricultural policies (Swinnen *et al.*, 2001; Anderson and Hayami, 1986). The classical lobbying theory, another strand of the interest group theory, contends that interest groups extend support to politicians facing re-election in exchange for favourable policies that maximize the welfare of their members. This approach is also commonly referred to as vote-buying models because it involves the exchange of resources in the form of campaign contributions in return for political favours (Grossman and Helpman, 1996).

Voter support models also employ quantitative methods to analyse policy processes and characterize the policy formulation process as the outcome of interactions among political actors and voters (Henning *et al.*, 2018c). Principally, these models assume that politicians behave rationally and maximize their political support by opting for policy induced welfare changes that voters prefer and thus will increase their chances of capturing or remaining in power. While both interest group and voter support models acknowledge that economic structures like the organizational costs of overcoming free-rider problems and the costs of income redistribution play an important role in influencing the choice of final policies, voter models differ from interest group models in that they further acknowledge that beyond the cost of organization, the relative income of social groups significantly impacts their bargaining power (Swinnen, 1994; Tyers and Anderson, 1992).

Limitations of past approaches in analysing policy processes in SSA

Although the models and theories greatly enhance our understanding of the factors that influence the choice of agricultural policies, they have several shortcomings that limit our understanding of agricultural policy processes particularly within the context of the dynamic political environment in SSA. One common drawback of these theoretical models is that they assume a democratic political system that is based on the logic of political competition in western democracies. However, a significant proportion of countries in SSA are young and emerging democracies with

considerable limitations. As a result, political processes like lobbying by agricultural interest groups often take rather different forms than those assumed for instances in models proposed by Grossman and Helpman (1996). Failure to consider the distinct attributes of the political systems in SSA makes it difficult to examine the impact of democratization and stakeholder engagement on the agricultural policy choices on the sub-continent.

Additionally, these models do not account for the increasingly influential role of non-state actors like donors and civil society organizations in the agricultural policy making process in SSA, particularly in the post structural adjustment program era. Also, new actors such as NGOs and private sector organisations are beginning to play prominent lobbying roles in the policy formulation process in these countries. Their effects on the lobbying process cannot be properly captured if they are ignored in policy modelling.

Moreover, approaches like interest group theories and voter support models that attempt to explain the role of political institutions based on simple dichotomous comparisons of agricultural policies in democratic countries and autocratic countries or in rich and poor countries are problematic. Some scholars (see e.g. Olper, 2001) have attempted to address this by taking into consideration the quality of democratic institutions like the rule of law and accountability. However, with the exception of Henning (2004), the results of these studies are inadequate because they essentially just compare agricultural policies in poor countries with limited democratic institutions and industrialized countries with highly developed democratic institutions, but fail to provide an institutional explanation for the significantly different levels of effective agricultural policies across developing countries.

Lastly, most of the models described in section 1 examine the agricultural policy formulation process using comparative static frameworks. While these frameworks are apt at identifying factors that drive change, they are not suited to explaining the actual process of change. One of the main reasons for this is that they fail to account for the role of policy beliefs in the policy formulation process. This is even though a growing body of evidence suggest that policy beliefs, policy makers' and stakeholders' perceptions regarding the effect of different policy instruments on the economy are important determinants of final policy choice (Krueger *et al.*, 1991; Sabatier and Jenkins-Smith, 1993; Mockshell and Birner, 2020; Henning *et al.*, 2019).

1.1 Theoretical Framework of the study

To address some of the limitations in existing policy modelling frameworks highlighted in the preceding section, we follow (Henning *et al.*, 2018b) and employ a Computable General Political Economy Equilibrium Model (CGPE) approach in our study. This theoretical framework is based on the logic of a simultaneous political economy equilibrium proposed by Binswanger and Deininger. (1997). One of its key advantages is that it allows for the examination of the economic, political and institutional factors that shape agricultural policy processes like large-scale land acquisition. Generally, policy processes that lead to large-scale acquisition of land involve complex networks that include several actors and shaped by different socio-economic, political and institutional factors. Even though the understanding of how these interactions play out are an important building block in understanding policy outcomes, they have been largely ignored in the literature on large-scale land acquisition. To this end, this modelling framework, shown in figure 1.1, allows for not only a better understanding of the economic impact of large-scale land acquisitions, but also for an explicit consideration of the role of policy beliefs in the policy formulation process (Henning *et al.*, 2019).

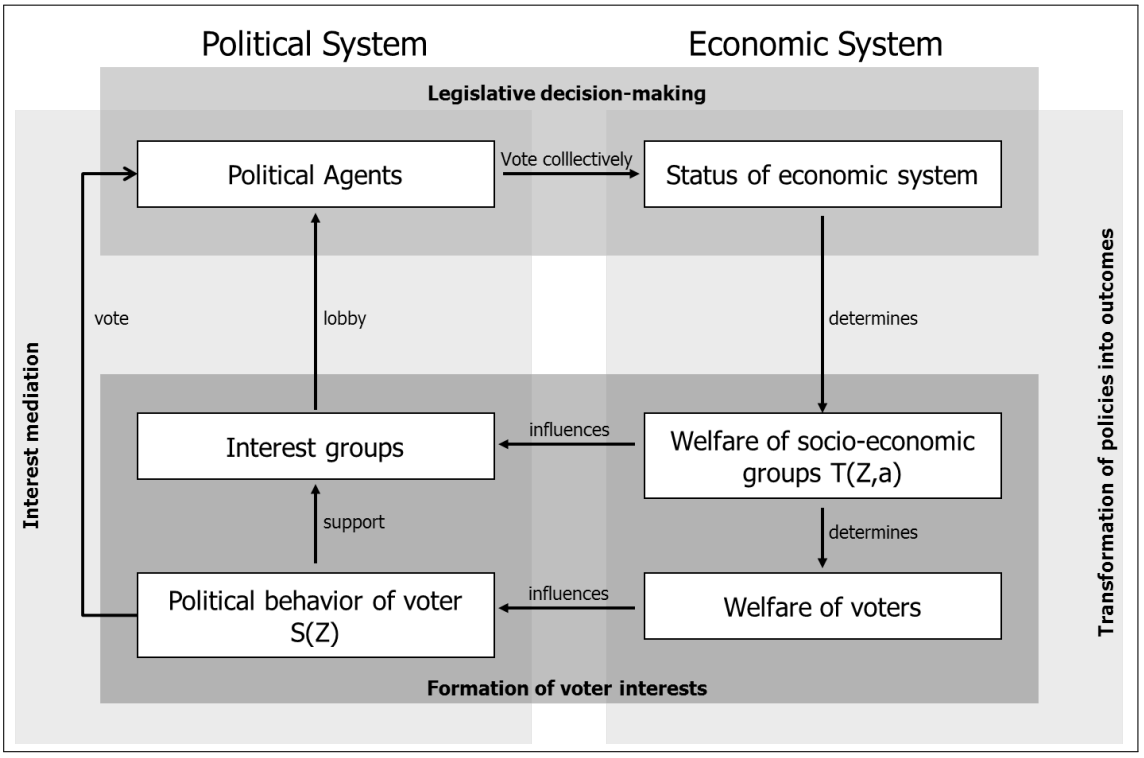
The CGPE framework has four components:

1. Interest mediation
2. Legislative decision making
3. Transformation of policies into outcomes
4. Formation of voter interests

In applying the political belief formation model to our research, our starting point is to undertake a policy network study to identify stakeholder organizations (governmental and non-governmental organizations) that are relevant in the large-scale land acquisition policy domain and to understand how interest groups and political agents interact and communicate to form policy beliefs. This is followed by an examination of the political decision-making process in the land and agricultural policy domain in Sierra Leone. This is done in two steps; First, an analysis of the role played by formal institution is undertaken through the application of a generalized power indices using a Baron and Ferejohn (1989) non-cooperative bargaining model. Second, the role and impact of informal and formal institutions in the choice of

final policy decisions are examined using a theoretically founded political exchange model developed by Henning and Hedtrich (2018) known as the Mean Voter Rule. We also use our theoretical model to nicely illustrates how political power structures determine the political control of different governmental organizations in the land policy domain.

Figure 1.1: Schematic representation of a political economy equilibrium



Source: Henning *et al.* (2018a)

From an economic perspective, in order to better understand how large-scale land acquisition policies translate into outcomes, an integrated micro-macro modelling approach is used to examine the expected impacts of large-scale land acquisition on economic growth, agricultural productivity, food insecurity, and levels of poverty. The macro-module corresponds to a Computable General Equilibrium (CGE) model that is linked to a micro-simulation model at the household level. The Micro- macro model, as demonstrated by Cockburn *et al.* (2014), addresses one of the main limitations of macro models. That is, their inability to measure welfare changes at the household level. Overall our theoretical framework allows for the evaluation of not only the political decision-making process, but also the economic effects of large-scale land acquisition at both the national and household level.

1.2 Summary

1.2.1 An Assessment of Land Reform Policy Processes in Sierra Leone: A Network-Based Approach

Large-scale acquisition of land in the developing world by mostly foreign investors continues to be one of the most topical and contentious issues in the development economics literature. In some countries, the displacement of small-holder farmers has triggered discussions about the need for land reform programs that could make land transfer processes less cumbersome, while at the same time strengthening the tenure security and protecting the rights of small-holder farmers (De Schutter, 2015). Some international development organisations including the United Nations Food and Agricultural Organisation (FAO) and the World Bank have sought to improve local participation and stakeholder engagements in the acquisition process through the introduction of initiatives like the Voluntary Guidelines on the Principles for Responsible Agricultural Investment; the Principles for Responsible Investment in Agriculture and Food Systems and; the Voluntary Guidelines on the Responsible Governance of Tenure (Committee on World Food Security, 2014; Seufert, 2013). Although a significant portion of the literature on large-scale land acquisition portray these acquisitions as one in which local and traditional authorities join forces with investors to acquire land from small-holder farmers (De Schutter, 2011; Edelman *et al.*, 2013; Galaty, 2012; Mann and Bonanomi, 2017), in reality, the acquisitions do not happen in a vacuum. Instead, they occur within governance systems and processes where the choice of these policies are shaped by economic, social and political factors (Cotula, 2012; Gingembre, 2015; Pedersen and Kweka, 2017; Scurrah *et al.*, 2015). They are also influenced by a wide range of actors including state and local government authorities, land users and owners, investors, civil society organisations and, in some cases, international development organisations and donors. However, to date, there is still a limited consideration of the effect of the political processes, and the role political and non-political actors play, in shaping the choice of these policies. The few studies that adopt a political economy approach to analyse the land acquisition process mostly omit the role of formal and informal institutions, and the importance of policy beliefs and political communications among the key stakeholders in the policy making process (see Hall, 2004; Krieger and Leroch, 2016; Lavers, 2012).

In this paper, we set out to evaluate a land reform policy formulation process that

emanated from the need to secure the property rights of land users, while at the same time making large-scale land acquisition process less cumbersome and efficient in Sierra Leone. Our study adopts a political economy approach that allows for a comprehensive evaluation of policy processes based on a micro-politically founded model. Specifically, we combine a belief formation model that builds on theories propounded by Friedkin and Johnsen (1990), with that of a legislative decision-making model based on the Mean Voter Rule developed by Henning *et al.* (2018a). Using data collected during an elite network survey in Sierra Leone in 2018, we quantify the political and knowledge-based power of communication within Sierra Leone's land and agricultural policy domain and the extent to which they influence the choice of land reform policies.

Our results indicate that the exchange of expert information within Sierra Leone's land policy domain follows a clearly defined structure with the executive branch of government and donor organizations wielding the most influence in the policy formulation process. The results also highlight the fundamental importance of informational exchange and the role of policy belief formation in the choice of large-scale land-related policies. Additionally, to the extent that information exchange facilitates consensus building within the land policy network, it enables stakeholder organizations who have no formal political power to influence final policy choice through the provision of valuable expert information to political agents. Finally, our results also demonstrate that when policy formulation is led by different institutional arrangements, different policy outcomes are observed. When agenda-setting is led by the Presidency and jointly by the Presidency and Ministry of Lands, they are more likely to opt for wholesome reforms than when it is led jointly by the Presidency, Ministry and Party leadership.

1.2.2 An Exponential Random Graph Modelling Approach to Assessing Lobbying and Political Power in Sierra Leone

This chapter builds on the previous one and assesses the underlying factors that drive the large-scale land acquisition policy formulation process. Given the importance of informational exchange in the choice of final policies within policy networks (Henning *et al.*, 2019), an identification of the factors that determine the emergence of policy networks are useful for the facilitation of efficient stakeholder driven policy processes. This is particularly the case in countries where the choice of suboptimal policies continue to hinder economic growth and poverty reduction (Fan and Rao, 2003; Henning *et al.*, 2018b). To this end, in this paper, we set out to answer these questions: Are the choice of policies within Sierra Leone's agricultural and land policy networks driven by structural factors like mutuality and transitivity? Alternatively, are policy choices driven by personal organizational attributes like similar policy views, and perceived political expertise?

At the methodological level, we employ a policy network-based approach and a Bayesian estimated Exponential Random Graph Model (ERGM) to estimate the network generating process and test for the impact of structural variables and organizational preferences on the exchange of expert knowledge and political support in Sierra Leone. Additionally, based on our best model specification, we use estimated network results to simulate 10,000 networks. We then apply the derived parameters to those of our realised communications network configurations to test for robustness of the estimated influence measure.

Our results show that policy networks are not entirely driven by stakeholder organisations need for information to form and update their policy beliefs. Rather, they are also driven by personal organizational attributes, policy preferences and beliefs and network structures. To this end, our estimated random graph model results suggest that there are strong structural effects of mutuality, transitivity and multiplexity that are associated with the existence of previous exchange relationships. Furthermore, there are indications that organizations predominantly rely on one another to determine the trust worthiness of an information source and the reliability of providers of political support. This underscores the importance of transaction costs in determining the emergence of networks in Sierra Leone's agricultural and land policy domain. Lastly, our results demonstrate that both the median final belief and group means of almost all land reform policies in our realised network are

very robust and in the case of the latter, significant at a 95% confidence interval.

1.2.3 Land Market Imperfections and Large-Scale land Acquisition in Sierra Leone: A Computable General Equilibrium (CGE) Analysis

Given the welfare implications of large-scale land acquisition, this paper investigates the economic impacts of land transfers against the backdrop of land and labour market imperfections. In most of the countries in Sub-Saharan Africa where large-scale land acquisition have been prevalent, property rights are unclear and insecure, generally resulting in high transaction costs and inhibiting the smooth transfer of land between users. Unlike previous studies that focus on the sheer scale and size of these investments, this article analyses the economy-wide and household welfare effects of imperfect land and labour markets and its associated transaction costs on land transfers between small-holder farmers and large-scale land investors in Sierra Leone. Given the importance of ownership and access to land on levels of income and poverty in rural communities, especially in contries where the majority of the population are dependent on agriculture for their subsistence, our paper's main contribution to the literature is that it provides new insights into the extent to which imperfect land and labour markets inhibit land transfers, income levels and welfare of small-holder farmers on the one hand, and the growth levels of the Gross Domestic Product (GDP) at the national level on the other hand. On a methodological level, we adopt an integrated modelling approach that combines a static Computable General Equilibrium (CGE) model, an imperfect land and labour market model, and a micro-simulation poverty module to undertake this analysis.

Our results show a positive relationship between lower levels of transaction costs and the volume of land transfers between small-holder farmers and large-scale investors. In relation to the welfare effects, while lower transaction costs increase land income for rural households, when it is exceedingly low, it results in small-holder farmers leasing almost all their land to large-scale investors based on the belief that they can lease land and still secure higher wage rates by offering their labour on the farm of large-scale investors. On the contrary, when huge volumes of land are transferred from small to large-scale farming sectors, it reduces the amount of land available for food cultivation, rendering small-holder-farmers largely reliant on the local market for their food need. It thus leads to an increase in food prices, while simultaneously depressing both on and off-farm wage rates because of the resulting

excess labour supply to both on and off-farm activities. The end results are that food prices will rise higher than income levels, leading to both negative equivalent variations and higher levels of poverty, particularly in rural households. However, our analysis suggests that the welfare effects will vary based on the differences in labour productivity and land use efficiency between the small-scale and large-scale farming sectors. When there is a significant labour productivity differential between the two farming sectors, it results in negative equivalent variations and higher levels of poverty in rural households. The opposite is true when land use efficiency differentials between the two farming sectors are not very high.

1.2.4 Land Grabbing in Sierra Leone: Government Capture or a Mismatch of Beliefs?

Deviating from the preceding three papers where the economic and political systems are separately examined, this paper combines the two systems to examine the political context within which large-scale land acquisitions occur. This is because, given the important role political institutions play in the choice and implementation of, agricultural and land policies, a purely welfare centric and economic approach to analysing land grabbing is clearly inadequate to understand the factors that determine the choice of these policies. From a political economy perspective, we attempt to empirically analyse whether political agents prefer large-scale land acquisition policies because they believe it will promote technical progress and growth in the economy, or because they are captured by particular interest groups of foreign investors or local large-scale farmers. At a methodological level, we develop an extended farm household model (FHM) to analyse the effects of land market policies on small-scale family farms in the presence of labour and land market imperfections. Specifically, rather than assume perfect rationality of the political choices that results in large-scale land acquisition policies, we attempt to empirically estimate the effect of political beliefs and political incentives on these policy choices. We also quantify the effects of transaction costs on the welfare of different socio-economic groups based on the policy beliefs and incentives of stakeholders and farm households.

Our estimated results demonstrate that there is a linear relationship between an organisation's aposteriori probability, a measure of preferred transaction costs. For most of our stakeholders, the higher an agent's belief is that farm-household's optimum transaction costs are farther away from the true equilibrium, the higher is

her preferred transaction costs. This indicates that stakeholders are mainly driven by their beliefs. Additionally, we do not find any empirical results in our study that there are agents who prefer low transaction costs because their primary incentive is to maximize the profit of large-scale farmers. However, our results indicate that there are some outliers. Driven entirely by their interests in maximizing urban welfare, these organisations prefer higher transaction costs than their beliefs suggest. Prominent among them are the top experts and managers of the country's economy. They include the International Monetary Fund, the Ministry of Finance, the Central bank of Sierra Leone, the National Revenue Authority, the African Development Bank and the Environmental Protection Agency.

By way of summary, the theoretical and empirical contributions of the main chapters in this thesis are presented in table 1.1.

Table 1.1: Overview of Chapter Contributions

Parts		**Chapter 2**	**Chapter 3**	**Chapter 4**	**Chapter 5**
Empirical Analysis	Social Network Analysis	†	†		†
	Econometric Analysis		†		†
	Simulations			†	†
Theory	Stakeholder Engagement	†	†		†
	Formal Institutions	†	†	†	†
	Informal Institutions	†	†		†
Policy Analysis	Economic Policy			†	†
	Agricultural Policy	†	†	†	†
	Land Policy	†	†	†	†

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Chapter 2

An Assessment of Land Reform Policy Processes in Sierra Leone: A Network-Based Approach

Edmond Augustine Kanu, Christian H. C. A. Henning

Abstract

As a predominantly agrarian country where land is one of the most important productive assets, land reform remains one of the most significant but contentious policy issues in Sierra Leone. Despite several failed attempts to reform the country's current land property rights and administrative arrangements, an assessment of why past reform policy processes have been unsuccessful is still absent. In this paper, we use data collected during an elite network survey in Sierra Leone in 2018, to quantitatively evaluate the land reform policy efforts that culminated into the 2015 National Land Policy. Specifically, we combine a belief formation model and a legislative decision-making model to quantify the knowledge-based power of the various stakeholders within the policy formulation process. We also examine the extent to which this knowledge based power influences the policy beliefs of policy-makers and other key stakeholders in the choice of land reform policies. Our results indicate that the main policy beliefs about current land-related policies do not significantly change as a result of the exchange of expert information within the policy network. This is because, key stakeholders largely rely on their own internal information for decision making, and only sparsely use expert information exchanges to update their policy beliefs. However, the results suggest that the policy network structure in Sierra Leone facilitates consensus building, a process that might lead to increased ownership of policy programs by local stakeholders.

Keywords: Land Reform, Land Grabbing, Policy Network, Stakeholder Influence.

JEL Codes: Q15, C54, D83.

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2.1 Introduction

In the wake of the global food and energy crises in 2007, an unprecedented increase in the acquisition of a huge swath of agricultural land for investment purposes, particularly in the developing world, caught the attention of many stakeholders in policy circles. This was mainly because of both the sheer scale of land involved in the acquisitions and the speed with which they occurred (Oya, 2013; Edelman *et al.*, 2013; De Schutter, 2011; Meinzen-Dick *et al.*, 2007). The acquisitions have been largely confined to south-east Asia and Sub-Saharan Africa (SSA), regions where the land rights of most land users are legally insecure either because of national laws that grant land rights and ownership to governments or colonial legacy that vested the ownership and control of land in the hands of local traditional authorities (Toulmin, 2009; Toft, 2013; Scurrah *et al.*, 2015).

In a significant number of reported land acquisitions, negotiations for the transfer of land occurred without the knowledge or consent of the land users, but rather through governments and/or traditional leaders who are generally regarded as custodians of the land (German *et al.*, 2011; Schoneveld *et al.*, 2011; Hall, 2010). This, in part, resulted in a number of forced evictions of land users, leading to critics referring to this new wave of land acquisitions as a form of ”land grabbing” (Lavers, 2012; Mann and Bonanomi, 2017; Alden Wily, 2014). As Borras and Franco (2013) would later observe, the term ”land grabbing” became synonymous with the acquisition of huge tracts of land at the expense of the displacement and expulsion of the poor and marginalized from occupied land with little or no consideration for the impact it will have on their livelihoods.

In the face of the increasing reports of forced evictions and displacement of land users for the purpose of large-scale acquisition of land by investors, calls for land reform that strengthens the land property rights of the small-holder farmers and land users have grown louder. The Food and Agricultural Organisation (FAO), for instance, has proposed voluntary guidelines that emphasize the prioritization of full community participation in all large-scale land acquisition processes (Food and Agricultural Organisation, 2012; Seufert, 2013; Paoloni and Onorati, 2014). Other commentators have suggested that, if the property rights of land users are formalized and legalized and their tenure security strengthened, they would be protected against forced evictions and would be better placed to have a say in subsequent acquisitions (De Schutter, 2015).

One country in Sub Saharan Africa (SSA) where large-scale investments in farmlands have triggered the debate about the need for land reforms is Sierra Leone. Emerging from a decade long civil war that had its origin steep in unequal distribution of resources, poor governance, and economic stagnation (Bøås, 2007), Sierra Leone is a small country of seven million people, with a land-mass of approximately 72,000 square kilometres (Statistics Sierra Leone, 2016). Richly endowed with very fertile soil, abundant rainfall, and rich mineral deposit, agriculture is the country's largest sector, contributing around half of its Gross Domestic Product (GDP) and employing about 60 percent of its workforce (The World Bank, 2019). Land is therefore, one of the most important productive assets for the majority of the country's households- about 57.2% of whom are classified as agricultural households- who rely on land for their basic sustenance (Statistics Sierra Leone, 2018). Accordingly, land-related policies play a very important role in driving sustainable growth and economic development in the country. Beyond socio-economic reasons, access to land plays an equally important role in influencing peace and cohesion within the country. A number of scholars (Richards, 1996; Unruh, 2008; Zack-Williams, 1999) have identified the lack of access to land by the country's growing youthful population for agricultural and other socio-cultural purposes in rural Sierra Leone as one of the factors that precipitated the country's eleven-year brutal civil war .

At the end of the country's brutal civil war in 2012, the government of Sierra Leone was very keen on attracting foreign direct investment into its fledgling agricultural sector. Among its numerous pitches, it claimed that only 15 percent of the country's 5.4 million hectares of arable land is under cultivation and that the remaining 75 percent is lying idle and waiting to be cultivated (Sierra Leone Investment and Export Promotion Agency, 2010). Since 2009, large-scale land acquisition increased tremendously in Sierra Leone. As in most parts of the world, the precise amount of land leased in the country is unknown. However, between 2009 and 2012, it was estimated that about one-fifth of the country's agricultural land had been acquired by mostly foreign investors (Baxter and Schaefter, 2013). According to the latest land matrix database estimates, 773,999 hectares of land deals have been concluded and contracted in Sierra Leone (The Land Matrix Global Observatory, 2016).

2.2 Sierra Leone's Land Reform Policy Context

Debates about the need for reforms of Sierra Leone's two-tier land tenure system [1] has been an elephant in the room since the 1980s. Successive governments, scholars and other commentators have argued that the absence of a land registration system and cadastral in Sierra Leone, the unwritten nature of its customary land tenure systems, and the extensive role played by chiefs in facilitating all land transactions under customary tenure leads to legal uncertainties around property rights and results in tenure insecurity and uncertainties in land ownership (Ochiai, 2017b; Unruh and Turray, 2006). This has led to suggestions that the current tenure systems, land laws and regulations inhibit productivity, discourages investments and limits the allocation of land to the most productive users (Johnson, 2011).

However, the calls for land reforms only intensified in the wake of the increasing acquisition of a large swath of farmland by foreign investors that resulted in the displacement of small-holder farmers in rural Sierra Leone (Ochiai, 2017a; Unruh, 2008; Melsbach and Rahall, 2012; Moyo and Kamara, 2009). On the one hand, advocates in favour of large-scale investment in agricultural land have called for reforms to end the existing cumbersome land transfer process and ensure that the most productive actors can easily have access to land (Johnson, 2011; Sierra Leone Investment and Export Promotion Agency, 2010). On the hand, civil society organisations and other interest groups have also supported the calls to reform land laws and regulation so as to strengthen the tenure security of land users through a land title registration system that will ensure secure property rights of small-holder farmers (Baxter and Schaefter, 2013; Green Scenery, 2011).

In relation to policy processes that result in the large-scale acquisition of land in the developing world, early reports of exclusion of land owners and users by local elite during negotiations (BBC, 2012; Die Zeit, 2012), and the widespread local and international protestations against the forceful eviction of land users (De Schutter, 2011; Reuters Africa, 2016) resulted in the promotion of inclusive policy instruments that favour stakeholder engagements by international development organisations like the United Nations Food and Agricultural Organization, the Clean Development

[1] Sierra Leone operates a two-tier land tenure system. The first, the freehold tenure systems, draws on the country's colonial past and is based on the English system of governance. It is applicable only in the country's capital city of Freetown and its immediate environs, which adds up to less than 1 percent of the country's total land-mass. The second land tenure system, the customary land tenure system is based on customary laws. This system applies to all other regions in the country apart from the Western area, which makes up to about 99 percent of the country's land mass

Mechanism (CDM) Executive Board of the United Nations Framework Convention on Climate Change (UNFCCC) and the World Bank. These instruments include, among others, the voluntary guidelines on the Principles for Responsible Agricultural Investment; the Principles for Responsible Investment in Agriculture and Food Systems and; the Voluntary Guidelines on the Responsible Governance of Tenure (Committee on World Food Security, 2014; Food and Agriculture Organization of the United Nations, 2014; Seufert, 2013). Donor community and international organisations have promoted these soft law instruments in part to facilitate stakeholder engagements, encourage free and informed consent in the acquisition process and to ensure that there is some form of buy-in and local ownership in communities where large-scale land acquisition occurs.

It is within this context that Sierra Leone commenced it latest land reform program. Officially, the land reform policy formulation process began with the establishment of a national land reform project by the Ministry of Land and Housing and the Environment, followed by a scooping activity in 2009 (Moyo and Kamara, 2009). At the end of a long and laborious process that included town hall meetings and multi-stakeholder platforms which brought together stakeholders from the governments, donor community, civil society organizations, women's group and traditional leaders, a policy document titled "National Land Policy" (NLP) was produced and formally launched by President Koroma in March 2017 (Ministry of Lands Country Planning and the Environment, 2015).

However, this is not Sierra Leone's first land reform efforts (see e.g. Ochiai, 2017b; Unruh and Turray, 2006; Williams and Obredola-Davies, 2006, for previous failed land reform efforts in Sierra Leone.). The factors that determine the success or failure of similar agricultural related policies like land reform in Sierra Leone and other Sub-Saharan African countries have been extensively discussed in the Development Economics and Political Economy literature. Persson and Tabellini (2016) suggest that specific characteristics of the policy formulation process result in biased policy outcomes. Lobbying activities by powerful interest groups are commonly identified as one of the sources of inefficient agricultural policies on the Sub-continent (Swinnen *et al.*, 2001; Anderson and Hayami, 1986). In Sierra Leone, for instance, past land reform failures have been attributed to pressure from powerful interest groups like Paramount Chiefs who are custodians of the land, and who have considerable political power and vested interests in maintaining the status quo (Acemoglu *et al.*, 2014; Peters and Richards, 2011; Unruh, 2008).

Additionally, the lack of scientific knowledge about how different land policies affect

society has also been identified as one of the reasons why some land reform policies have failed in the past. In his seminal work on land reforms, Deininger (2003) contends that many land reform programs fail because the policy formulation processes are not driven by scientific or empirical evidence, but rather by ideological positions. In circumstances where knowledge gap exists in a policy formulation process, there have been suggestions that communication and exchange of information between policy-makers and stakeholders who are knowledgeable in specific policy areas could lead to a choice of better policy options (Acemoglu and Ozdaglar, 2010; Golub and Jackson, 2010; Morrissey and Nelson, 2004). Hence, stakeholder engagements and participatory policy processes have been promoted by development partners and donors as essential in formulating sound policies (Chambers, 2007; Malkamäki *et al.*, 2019; Binot *et al.*, 2015).

In the case of Sierra Leone, expectations have been rife that the 2015 land reform effort will help spur economic growth and development because the policy formulation process followed a very participatory process where the views of a wide range of stakeholders were sought out and where the exchange of ideas and information among experts and the various stakeholder organisations could have resulted in the choice of sound policies. To this end, this paper aims to examine the implementation of the 2015 land reform policy process in Sierra Leone and quantitatively evaluate the informational value of communications during the policy formulation process. It also assesses the extent to which the exchange of expert information within the country's policy network affects the choice final policies. Specifically, we set out to answer the following questions:

1. Who are the key policy makers in the land reform policy formulation process in Sierra Leone and what policy issues interest them?
2. Which actors have access to the most influential policy makers and to what extent do their access to these policy makers shape final policy choices?
3. What are the key factors that influence the choice of final land reform policies in Sierra Leone?

We draw on Henning *et al.* (2019)'s Mean Voters model - a theoretical model that combines belief formation and a legislative bargaining process - to measure the complex interaction among the various stakeholders and their influences in the land reform policy formulation process. Data used in this study were collected through an elite network study, a data collection method that allows for the collection of

quantitative network data and policy beliefs. The survey was administered through a face-to-face interview using specially designed questionnaires suitable for policy network studies.

The rest of this paper will have the following structure. After this introductory section, the next section discusses the theoretical framework adopted in the study. The data collection method is described in section 2.3 and the empirical results of the study are presented in section 2.5. In section 2.6, we will conclude with a summary of our findings, some limitations of our study and an outlook for future research.

2.3 Theoretical Framework

2.3.1 A Theoretical Framework of Policy Formulation: A General Overview

The state of a society's welfare is generally a function of the provision of certain public and private goods. The provision of these goods is based on the implementation of certain policy choices. A specific policy choice can be broadly divided into the policy preferences of actors and the processes through which those policy preferences are aggregated into final policy choices. In the Political Science literature, the term policy preferences are used to describe the set of policies actors would like to see implemented to achieve a desired end state. Policy beliefs, on the other hand, provide a window through which one gets a glimpse of an actor's conceptualization of how specific policy instruments impact the state of the world (Deininger, 2003; Mockshell and Birner, 2015; Birner and Resnick, 2010; Henning, 2000). An actor's policy beliefs and policy preferences are therefore interconnected because the former drives the latter.

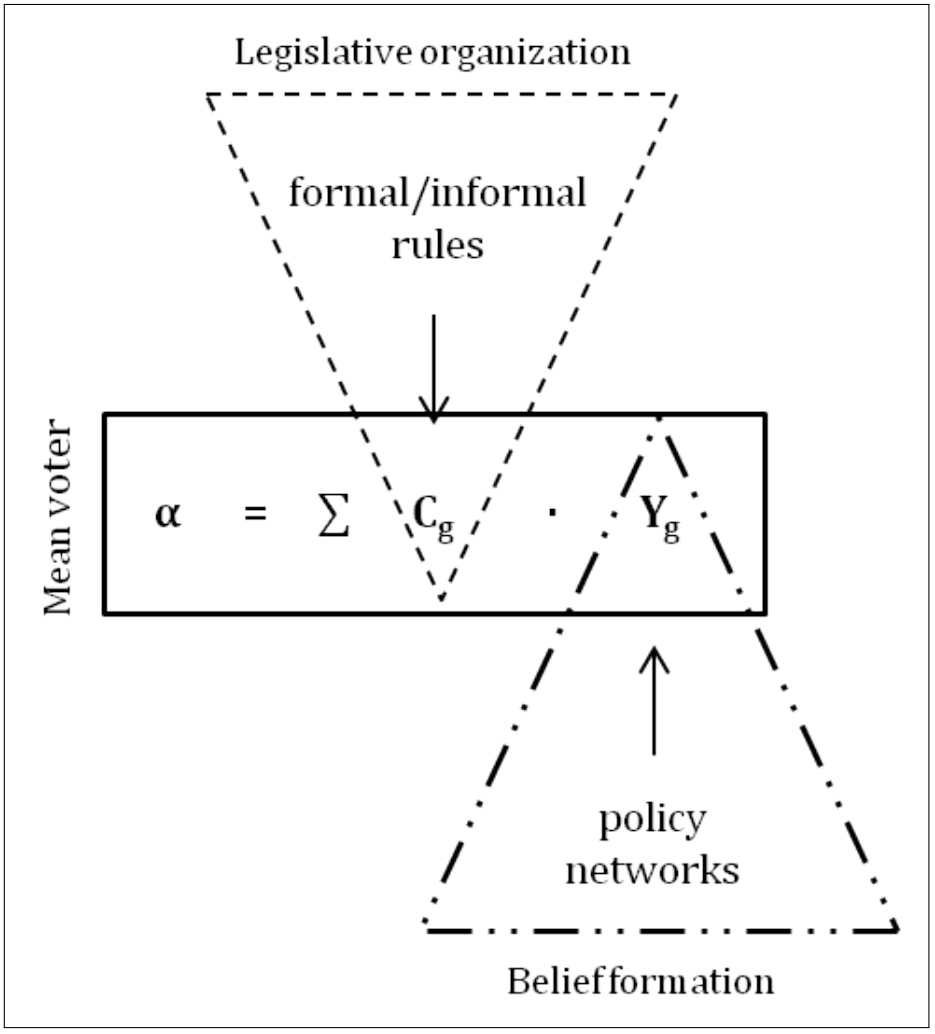
Generally, actors form policy beliefs using their mental models. Mental models are people's way of simplifying how complex systems work (say for instance the functioning of a country's economy). These mental models (i.e policy beliefs) are mostly based on actors pre-existing knowledge about how specific policy instruments or strategies impact the real world. However, since policy evaluation processes are in themselves complex and all humans have intellectual and cognitive limitations, all actors, whether policy experts, political agents or ordinary citizens, do not have a perfect mental model that fully captures the true relationship between specific policy

instruments and their impact on the state of the world. Thus, in a bid to improve their mental models, actors deepen their understanding of these complex relations through two principal way. Firstly, they do so by learning -through observation- about how systems react to specific policy choices. Secondly, they perfect their mental models through the exchange of information with policy experts and other political actors. It is through the latter, that is informational exchange, that actors who have no constitutional or formal policymaking responsibilities in a society, influence the policy making process. If and when they communicate with policymakers, their knowledge about specific policy instruments or strategies become an important channel through which they influence final policy choices.

It should be noted that policy beliefs differ across actors based on their understanding of how policies translate into outcomes. The policy beliefs of political actors, for instance, is different from say policy experts like trained economist or development practitioners, who are more knowledgeable about the complex relationship between policy instruments and their impact on society (see e.g. Bischoff and Siemers., 2011; Blendon *et al.*, 1997; Rhoads, 1985; Walstad, 1996). Caplan (2001) conducted a statistical study and concluded that the policy beliefs of politicians are different from that of policy experts because while the policy beliefs of the politicians are affected by naïve judgmental anomalies, expert policy beliefs, on the other hand, are largely unbiased and true. Thus, in such instances, an exchange of expert information between policy experts and politicians could help the latter update their knowledge and lead to the choice of efficient policy options.

Accordingly, our theoretical framework consists of two components that explain the policy formulation process described above. These two components, as illustrated in Figure 2.1 are: i) a belief formation model (lower triangle) and ii) a legislative bargaining model (the rectangle) that is informed by an analysis of the country-specific legislative process (upper triangle). Our analytical framework is based on two strands of literature. First, we follow Friedkin and Johnsen (1990) and use a Non-Bayesian set-up to model belief formation. We then employ the non-cooperative legislative bargaining model of Baron and Ferejohn (1989) to model the legislative decision-making process in Sierra Leone. Our model, the Mean Voter Rule, developed by Henning *et al.* (2019), is given by the equation in Figure 2.1. In essence, the mean voter rule reproduces final policy decisions as the result of cooperative political bargaining among agents with individual ideal positions Y and political power C. We now provide a detailed description of the two main components of our theoretical framework.

Figure 2.1: Overview of Theoretical Framework.



Source: Henning *et al.* (2019).

2.3.2 Belief Formation Modeling

We model belief formation using a non-Bayesian approach similar to that employed by Friedkin and Johnsen (1990). Our analysis also draws on the work of Pappi and Henning (1998) who used a social influence model to analyze the policy formulation process in Germany, Japan and the USA. Our model of belief formation is based on the notion that an individual's final policy position is formed by taking the weighted average of the policy beliefs of individuals from whom they receive information about the impact of policy decisions through communications, and their own initial policy position

Specifically, we divide the belief formation process into three components. The first component is the initial policy beliefs. The initial policy beliefs of actors are formed based on their observations of how specific policy instruments impact the state of the world using simplified mental models. Initial policy beliefs, A_i^0, of actor i is, therefore, a reflection of her inference from observations without taking into consideration information received from other actors via communication. Initial policy beliefs are thus influenced by exogenous factors like observational learning even before an actor update her policy beliefs through communication with other actors.

The second component of the belief formation process is the communications network. It is the channel through which the exchange of expert information about policy instruments and their impact on society's welfare occurs. Let us denote the set of actors that participate in a communications network as a country's political elite (E), where i represents a generic element of E. These political elites consist of political agents g, who are constitutionally responsible for determining national policies, and a subset of non-governmental actors who have no formal constitutional or legislative responsibilities. It follows then that it is extremely difficult, if not impossible, for each actor to establish communications ties with all influential actors in the network since access to the set of actors that influence final policy positions is highly restricted.

Let our communication network be defined as a binary network M, where $M_{ij} = 1$ signifies that actor i and actor j have an established communications tie. Furthermore, we define the subset $E_i = j \in E,\ M_{ij} = 1$ as the neighbourhood of actor i, where it is the case that

$$\sum_{j \in E_i} m_{ij} = 1 \text{ with } m_{ij} = \frac{M_{ij}}{\sum\limits_{j \in E_i} M_{ij'}}. \tag{2.1}$$

Accordingly, we can denote the communications network as $M = [m_{ij}]$ where $m_{ij} > 0$ indicates that actor i pays attention to actor j. M is assumed to be a row stochastic matrix where the sum total of the weights for each actor equals 1.

The Belief Formation Process : The third component of the belief formation process outlines the procedures through which individual actors combine their own beliefs with that of the beliefs others communicate to them in the policy network to arrive at their final policy beliefs. Our framework proposes that individuals update their initial policy beliefs A_i^0 by taking the weighted averages of their neighbours' beliefs A_j^0 with m_{ij} representing the weight that actor i places on the current belief of actor j and m_{ii} being the weight of actor's own belief (see Jackson, 2008):[2]. This is represented in the equation below:

$$\begin{aligned} A_i^* &= m_{ii}A_i^0 + \sum_{j \neq i} m_{ij}A_j^0 \\ \Rightarrow A_i^* &= m_{ii}A_i^0 + (1 - m_{ii}) \sum_j \hat{m}_{ij}A_j^0 \quad \text{with} \quad \hat{m}_{ij} = \frac{m_{ij}}{(1 - m_{ii})}. \end{aligned} \tag{2.2}$$

Where A_i^* represents the belief of agent i after communication.

Own communication is a measure of the extent to which an actor relies on his or her own expertise on specific policy instruments in the process of forming his final policy belief. M represents a row normalized to one and $(1 - m_{ii})$ is the aggregate weight of all neighbors beliefs in actor $i's$ belief.

Let m_{diag} represent the diagonal matrix with diagonal elements m_{ii}. Then eq. 2.2 can be re-written as:

$$a^* = \left[I - (1 - m_{diag})\,\overline{M}\right]^{-1} m_{diag}a^0, \tag{2.3}$$

Where $\widehat{M} = \left[I - (1 - m_{diag})\,\overline{M}\right]^{-1} m_{diag} = [m_{ij}]_{i,j \in E}$ represents the network multiplier matrix. This matrix multiplier takes all communication loops into consideration among actors and captures all the direct and indirect effects of actor $j's$ initial belief on $i's$ belief resulting from informational exchange. An element of the multiplier matrix m_{ij} is that it defines the field strength of actor $j's$ initial belief operating on actor $i's$ final belief. If $i = j$, the element m_{ii} of the multiplier matrix M equals the weight that an actor i puts on his own initial belief. In sum, for all row stochastic matrices, the belief formation process described above results in a final policy belief a^* as the weighted average of the initial belief of all actors before communication a^0. The weight of actor $j's$ initial belief for actor $i's$ final belief is equal to the element

[2]Friedkin and Johnsen (1997) assume that all actors attribute the same weight to their own initial belief. However, we make no prior assumptions about the weight that actors place on the beliefs of others in our belief formation module but ascertain their own control empirically. Note that heterogeneous weights among actors will still deliver an unambiguous final policy belief.

m_{ij} of the multiplier matrix M. [3]

2.3.3 Consensus Building in Policy Networks

The possibility that the exchange of expert information within policy networks will results in consensus building among participants is a function of the embeddedness of actors with heterogeneous policy beliefs within the network and the receptiveness of actors to the information shared by others. Firstly, if we consider our communications networks as a connected component where say two agents are connected to each other through direct or indirect communication ties and assume that $m_{diag} = 0$, then the product of the belief formation process will be a perfect consensus (Golub and Jackson, 2010).

However, in practice, the assumption that communications networks are a connected component is far fetched and improbable. Rather, as stated earlier, communication networks are very structured and restricted. Most often than not, members of such networks communicate with only a minute subset of the whole populations (see e.g. Henning *et al.*, 2018). Thus, in instances where views within a network are divergent, the exchange of expert information will not result in consensus building among the members in the communications network.

Additionally, it follows from 2.3 that the level of trust that agents place on the belief of others they communicate with determines the level of consensus that can be reached as a result of informational exchange. To this end, assuming that $m_{diag} > 0$ implies that communication converges to an equilibrium point, even though actors could hold heterogeneous policy positions. In our general model, actors might have different relative levels of trust that they place on their own policy positions and that which they place on the policy position of other actors. These different levels of trust in their own positions might be based on the level and quality of information available to an actor. For instance, poorly informed actors might place more weight on the communicated positions of other actors, while experts might place more weight on their own positions. Therefore, consensus building is not self-evident in our model. Rather, it is dependent on the country-specific attributes of the elite communication network.

[3] Please note that the belief up-dating in eq. 2.3 is similar, but still differs from the DeGroot model analysed by Jackson (2008). In particular, our model considers the DeGroot and the Friedkin model as a special case.

2.3.4 Modelling Legislative Bargaining

We model legislative decision-making using Henning *et al.* (2019)'s mean voter decision rule, a theoretical model that combines Baron and Ferejohn (1989)'s legislative decision-making model and Grossman and Helpman (1996)'s interest group model into a cooperative legislative bargaining model. The Mean Voter Rule postulates that final policy choice is a result of package deals among political agents that are based on an agent's ideal policy positions (Y_g) and an agent's political power (C_g). Final policy decisions in the legislation is an outcome of a legislative bargaining process among different set of legislators g is a member of (N_g), all of whom have heterogeneous policy preferences (U_g). While various political agents want to have their ideal policy positions implemented by politicians, their preferred positions can only be implemented within constitutional rules. Within these rules, individual legislators will require support from a winning coalition to have their ideal policy positions implemented. Thus, the legislative bargaining process is akin to a competition that involves the formation of winning coalitions among different political agents. The probability of being part of a coalition is dependent on constitutional rules and the embeddedness of an agent in the constitutional system.

Political agents are aware that a non-corporative political legislative bargaining process would result in an uncertain policy choice because it will be similar to a lottery over agents' ideal positions. If we thus assume that politicians are risk averse, then such a non-corporative legislative bargaining process will be deemed as inefficient. Hence, political agents have an incentive to agree, ex-ante, on a corporative policy formulation process that guarantees each political agent a higher pay-off. To this end, the mean voter decision rule is a self-regulating mechanism as long as legislators do not discount future gains from corporation too much.

Therefore, the final policy decision corresponds to the weighted mean of legislators' ideal position Y_g is denoted as:

$$\alpha = \sum_g C_g Y_g \text{ with } \sum_g C_g = 1. \tag{2.4}$$

Where the weight C_g of an agent's g ideal position reflects her voting power which is determined by political institutions. Technically, under certain assumptions, C_g equates to the ratio of the number of winning coalitions in which an agent g is a member and the sum of these numbers for all relevant political agents. Under this assumption, the political power C_g is akin to the classical Coleman-Banzhaf voting

power index which measures the ability of an actor to change a vote (Banzhaf, 1965; Coleman, 1971).

2.3.5 Derivation of Voting Power Indices

To measure the distribution of power among agents, we calculate a voting power index through a) the identification of votes that are compulsory for a final decision to be made and b) by defining the threshold of votes to be met before a collective decision is made. Generally, a distinction can be made between formal and informal voting power games. Formal power games emanate from legislative processes in democratic systems as enshrined in a country's constitution. Such processes typically start with a parliamentarian or a member of the executive branch of government submitting a bill to parliament. Such a bill will then make it way through the committee stages, undergoing various modifications in the process, including amendments, before it is finally presented on the house's floor for a final vote.

Informal power distributions, on the other hand, are based on internally enforced standards of legislative power. As Shepsle and Weingast (1987) contend, observed power distributions are not only limited to formal institutional rules. Thus, although the general policy formulation process follows clearly laid down rules and regulated procedures spelt out in a country's constitution, political agents informally delegate agenda-setting power on specific policies to certain ministries or public agencies who are in charge of specific policy areas. Additionally, as Bratton (2007) argues, the rule of law is very weak, even if not entirely non-existence, in the developing world. In these circumstances, one of the most prominent informal institutions that significantly influences many aspects of political decision making in Africa is the "Big Man" presidentialism. The "Big man" presidentialism typifies a situation in which formal institutions and laws become secondary and instead, political power becomes highly personalized and concentrated around the presidency, leading to an increasing political power in the hands of the president and his or her cabinet (see also Van de Walle, 2003). As a result, informal rules and structures override formal institutions and structures to ensure that political power largely resides within the cabinet and presidency. This makes final votes on the parliamentary floor largely meaningless and merely academic.

To measure the voting power of a political agent, we employ the concept of Banzhaf power indices. The Banzhaf Power indices calculate the voting power of an agent by counting all the possible winning coalition, and for each agent all the winning

coalitions, where her vote is critical in ensuring that the coalition wins (Banzhaf, 1965; Coleman, 1971).

2.3.6 The Generalized Political Power Index

Based on the descriptions of the belief formation process and the mean voter rule, the final policy decision α^* that results from the exchange of expert information among members of an elite network follows from:

$$\alpha^* = \sum_g C_g(\sum_j m_{gj} Y_j^0 + m_{gg} Y_g^0), \text{ with} j \neq g, \tag{2.5}$$

Where m_{gj} represents the weight that agent g puts on the initial belief of actor j and m_{gg} the weight that the actor places on his own initial belief. The above equation thus constitutes our theoretical model. This framework considers the policy formulation process as an aggregation mechanism for the various policy positions Y_i based on the belief formation in networks and the voting power distribution in parliament C_g.

Based on our theoretical model, we derive the generalized political power index and use it to analyse the political power behind knowledge transfer in communication networks, and how it influences power outflow from political agents to other stakeholder organisations without political power. We compute this index by combining the power of an actor to influence the policy beliefs of other actors and her political capacity in determining the final policy decision. The generalized political power index is shown below:

$$C_j = \sum_g m_{gj} C_g, \tag{2.6}$$

Where m_{gj} represents the weight agent g places on actor j's initial belief and C_g represents agent g's formal and informal voting power.

In summary, generalized power index summarizes a) the political influence of actors who have no original voting power, but nonetheless shape policy choice through the exchange of their expert knowledge with political agents who have formal or informal political power and b) the political influence of actors with original voting power who give up some of their original power of determining final policy choice in exchange for expert information in an elite communications network. These political agents rely on these informational exchanges to form their final policy position. The

lower the number of actors that have access to an information receiver, the higher is the influence of the information sender's position on the final policy position of the information receiver. Actors can contact influential players both directly, or indirectly, through other policy brokers.

2.4 Data

2.4.1 Study Design and Data Collection

To evaluate the land reform policy formulation process in Sierra Leone, we conducted an elite network survey in country between October and November 2018. The data collection process took the form of a face to face structured interview using specially designed questionnaire suitable for policy network studies (Pappi and Henning, 1998, 1999a; Laumann and Knoke, 1987). The units of observation in our survey were stakeholder organizations who are considered as major players in the policy formulation process. Stakeholder organisations were thus treated as corporative actors because of their formal policy formulation responsibilities (Coleman, 1990). Accordingly, in the course of administering our questionnaires, we emphasized to respondents that we were particularly interested in the views and positions of their organizations and not their personal opinions.

To ensure that our data is suitable for the assessment of a policy formulation process, a consistent specification of the set of actors that are important in the policy formulation process in our specific policy domain was imperative. To do this, we specified the boundaries of our network using a two-step approach normally applied during previous policy network studies (see Knoke *et al.*, 1996; Laumann and Knoke, 1987; Laumann *et al.*, 1989; Pappi and Henning, 1999b). In the first step, through a desk research, review of policy documents and discussions with local policy experts in the agricultural and land reform policy domain in Sierra Leone, we developed a list of potential organizations to be interviewed. This preliminary list included 107 organizations and served as a guide in our choice of the set of organizations to be interviewed.

In the second step, we drew on past experience garnered during previous network studies to select, from our preliminary list, the first set of organizations to be interviewed. These first set of organizations were principally stakeholder organizations who have formal political power and known to be very important in the agricultural

and land reform policy domain. These stakeholder organizations included, among others, the Ministry of Lands Country Planning and the Environment, the Ministry of Agriculture and Food Security, the Ministry of Finance and other subordinating ministries. During each round of interviews, we used a reputation question in our questionnaire to determine the next set of organizations to be interviewed. The reputation questionnaire asked respondents to mark organizations they consider especially influential in the agricultural and land reform policy formulation process. Organizations that were nominated more than three times were then interviewed in subsequent rounds of interviews. This snowballing procedure was used until all the relevant organizations in the land reform policy space were interviewed. At the end of the survey, a total of thirty-nine stakeholder organizations were interviewed (see section B.1 for the list of interviewed organizations).

Our questionnaire was divided into five parts. In parts one and two, we collected data about generic agricultural policy goals and positions and specific agricultural policies in line with Sierra Leone's Comprehensive African Agricultural Development Plan (CAADAP) compact, the National Sustainable Agricultural Development Plan (Ministry of Agriculture Forestry and Food Security, 2009). Part three of our questionnaire covered the 2015 National Land Policy and collected data about specific policy position and concerns in the final policy document (Ministry of Lands Country Planning and the Environment, 2015). In part four, which covered the policy network section, we collected data about reputation, communications, political support and social relations. Part five of the questionnaire focused on the different organizational attributes of our stakeholder organizations. For this paper, we relied on data collected in parts three and four of our questionnaire.

The focal point of our model is the communications network. It contains data about the exchange of expert information between different stakeholders within the agricultural and land reform policy space. For our study, we refer to expert information as any type of information that details the impacts of a policy instrument on the state of the world. An example of an expert information would be the impact of land titling on agricultural productivity and investment in the agricultural sector. Data on expert information were collected from both a demander (organisations that receive expert information from other organisations) and supplier (organisations that provides information to other organizations) perspective. Accordingly, respondents were asked to mark all organizations to whom they provided expert information on agricultural and land reform policies regularly (supply) and those from whom they receive agricultural and land reform policy related information reg-

ularly (demand). If both a receiver and supplier separately reported the exchange of information between their organizations, that particular informational exchange or knowledge transfer is considered as confirmed. We used this information to construct a confirmed communications network, a network considered to be more reliable for network analysis from a theoretical point of view (Pappi and Henning, 1999b).

Another important component of our belief formation model is the weight stakeholder organizations place on their own initial policy beliefs. To collect data on the weights actors placed on their own initial policy beliefs, respondents were requested to determine the relative importance they place on externally provided information in relation to their own expertise in the policy impact evaluation process. To this end, respondents were requested to divide 100 points between the weights they placed on externally provided information and that which they placed on their own expertise.

As mentioned earlier, part four of our questionnaire collected data about Sierra Leone's land policy reform program. It focused exclusively on the relative interest in, and preferred position of stakeholder organizations in the achievement of the most important policy issues covered during the 2015 land reform policy reform formulation process in Sierra Leone. This was done using a nested structure. In the first nest, we collected data about the relative interest in specific land reform policy issues. These policy concerns consisted of relevant policy outcomes drawn from Sierra Leone's National Land Policy (NLP) document (Ministry of Lands Country Planning and the Environment, 2015). They broadly cover issues related to land rights administrations and land property rights. At the second level of our nest, we collected data about stakeholder organisations interest in and position on specific policy issues. The full list of the policy positions is listed in table 2.1.

To model policy belief formation, we follow Henning *et al.* (2018) and represent stakeholder organizations' policy position concerning the various policy strategies as their initial policy positions. To ensure comparability and enable us to assign actors to specific locations within our policy space, we used a 7-point ordinal scale. Our ordinal scale had fixed and meaningful poles which served as an empirical metric that measured the distances between actors. Our rating scale ranged from 1, implying policy position that supported reforms, to 7, implying policy positions that supported maintaining the current status quo. We also identified organisation's interest in specific policies. Here, we asked respondents to distribute 100 points across the policy components based on their relative importance to their organisations. [4]

[4]It should be noted that our main aim here is to predict the true policy beliefs of the different

Table 2.1: Description of land reform policy beliefs and interests

Policy Positions	Variable
Establishment of a new land administrative framework	New_Admin_Frame
Customary land governance reform	Customary_Reform
Establishment of a comprehensive land title registration system	Land_Titling
Land demarcation, mapping and survey services	Map_Survey
Land property rights of women	PR_Women
Land property rights of foreigners	PR_Foreigners
Taxation of land leasehold fees	Tax_LHF
Land property rights of large-scale land investors	PR_LSLI
Land property rights of small holder farmers	PR_SHF

Source: Authors own representation.

2.4.2 Legislative Power Distributions

To model the legislative bargaining process and ascertain the political decision making power political agents transfer to other non-political stakeholder organisations as a result of knowledge transfer in our communications network, we combine the network multiplier with political decision-making power to derive the total political power of stakeholder organizations. This is done by first calculating the indices that represent the voting power distributions of various political actors in the policy formulation process. To do this, our starting point is the definition of the threshold of votes to be met before a collective decision is made. After that, we identify actors whose votes are required for a final decision to be reached. This is done by applying the concept of the Banzhaf power index to calculate the power indices for specific voting power games in our study area (Banzhaf, 1965).

We start by selecting our voting power games based on both the constitution of Sierra Leone and a desk review on the attributes of the political decision making process in Sierra Leone. First, we follow Bratton (2007) and Van de Walle (2001) to argue that the principle of "Big man presidentialism" applies to the political set up in Sierra Leone. Furthermore, we assume that Sierra Leone's constitution confers agenda setting powers on the president. This cover the initiation and submission of bills to the house of parliament. Additionally, we take note of the fact that the country's governance is based on a presidential system where legislative matters are decided based on a simple majority rule in parliament. The president, however,

stakeholders and how the exchange of expert information affects the belief formation process. Thus, our variable construction should be regarded as purely illustrative.

has a binding veto power which requires a two-third parliamentary majority to be overridden. This implies that the executive branch of the government has a binding agenda setting power. In practice, however, parliament wills little significant power and its role is largely ceremonial in the policy formulation process. On this basis, we formulate the relevant legislative games, taking into consideration the dominant role played by the presidency and government ministries based on these informal legislative norms.

However, the literature does not succinctly spell out the roles of various governmental ministries in the policy formulation process. We, therefore, formulate various country-specific legislative games. In the first scenario, we assume that land reform policies are largely driven by the Ministry of Lands, Housing and the Environment (MLHE) who have an agenda setting power, vis-à-vis the cabinet including the president. In this scenario, the cabinet is assumed to have a final approving power based on a simple majority vote. In the second scenario, we assume that the president functions as a 'primus inter pares' in his cabinet and has agenda setting powers through his or her cabinet. In the third contrasting DUO scenario, we assume that the presidency and the MLHE share an agenda setting power. Lastly, we consider three further scenarios (MLHEPARL, PRESPARL and DUOL) in which we assume that legislative decision making in Sierra Leone is characterized by party leadership (that is the ruling party, the Sierra Leone Peoples Party (SLPP), has an agenda setting power). In these three government led scenarios, we assume that legislative decision-making power is shifted among MLHE, the President, MLHE and the President, and the ruling party concomitantly. It should be noted that the main opposition party, The All Peoples Congress (APC) is included merely for the sake of completeness as they do not have any agenda-setting power in all of the abovementioned scenarios. The calculated Banzhaf power indices are presented in table 2.2.

Table 2.2: Banzhaf Power Index

	MLHE	PRES	DUO	MLHEPARL	PRESPARL	DUOL
OPRES	0.122	0,268	0.258	0.096	0.212	0.205
MAF	0.268	0.122	0.258	0.212	0.096	0.205
MOF	0.122	0.122	0.097	0.096	0.096	0.077
MLHE	0.122	0.122	0.097	0.096	0.096	0.077
MLGRD	0.122	0.122	0.097	0.096	0.096	0.077
MOPED	0.122	0.122	0.097	0.096	0.096	0.077
MTI	0.122	0.122	0.097	0.096	0.096	0.077
APC	0	0	0	0	0	0
SLPP	0	0	0	0.212	0.212	0.212

Source: Calculated by authors from own data.

2.5 Results and discussion

2.5.1 Relevant Actors in Sierra Leone's Land Policy Domain

The list of the thirty-nine stakeholder organizations we interviewed in our policy survey and their corresponding indegrees of centralities are presented in table B.1. The indegrees of centralities (IDCs) of the reputation network are a summary of nominations received by all organisations in our land reform network domain. These IDCs are calculated by summarizing nominations received by each organization, standardized by the number of the maximum possible nominations, excluding self-nominations (Wassermann and Faust, 1994). In our model, it is a measure that quantifies the prominence of an actor in a directed network, signifying the perceived influence of stakeholder organizations in the land reform policy domain in Sierra Leone. Our estimates indicate that in Sierra Leone's land reform domain, the Ministry of Agriculture and the Ministry of Lands are perceived as the most influential organizations, with each having an indegree centrality measure of 0.97 and 0.95 respectively. This is followed by the paramount chiefs, the legal custodians of all customary land, and the most prominent donor organization in the policy domain,

the United Nation's Food Development Programme (UNDP). At the group level, the executive branch of government is perceived to be the most influential group with an indegree centrality score of 0.77. This is closely followed by donors and public agency with an indegree centrality scores of 0.75 and 0.72 respectively. On the other hand, agricultural producers (0.64) and agricultural industries (0.52) are seen as not highly influential in this policy space

2.5.2 Structure of Communications within Sierra Leone's Land Reform Policy Domain

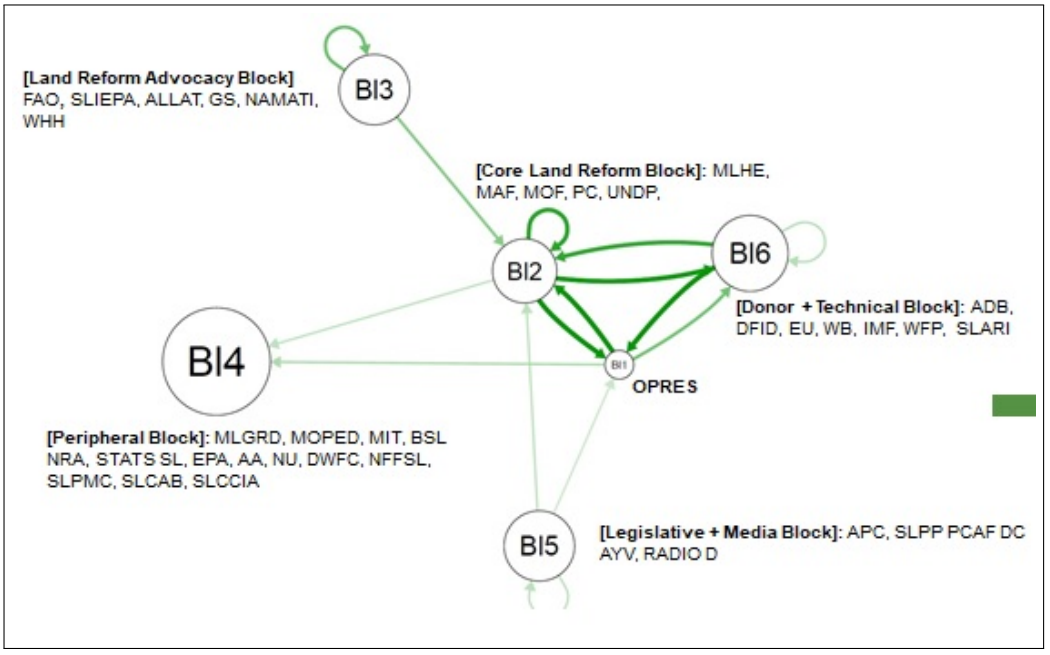
We employ a block model analysis to identify the structure of expert communications using Butts (2008)'s Social network Analysis package developed for the "R" statistical package. Block Model analysis, a positional analysis based on structural equivalence, allows for the identification of actors with the same pattern of relations to other actors within a network. Its application to quantitative network data enables us to identify the embeddedness of stakeholders in our land reform policy domain. Accordingly, our results indicate that the exchange of expert information within Sierra Leone's land policy domain follows a clearly defined structure. Based on our block model analysis, we identify a pattern of exchange of expert information which can be divided into six blocks. This includes; the office of the president (block I1), a core political and land reform block (block I2), a land reform advocacy block (BI3), a peripheral block (BI4), a legislative and media block (B15), and a donor and technical block (BI6). This communications structure is illustrated in figure 2.2 and depicts the underlying political communications structures in Sierra Leone's land policy network. As can be seen, the graph consists of six blocks, with the size of the blocks representing the number of actors in each block. The arcs show the flow of information to and from a specific block and illustrate the existence of established ties between and among the different blocks. The size of the arc illustrates the amount of expert information exchange that flows between blocks. The edge-weight boxes indicate the extent to which information flows between and within networks based on the network densities. Dark green edge-weights for instance signify that there is a lot of information flow occurring between blocks while a light green illustrates the opposite. We use densities, a measure of the ratio of established ties and all possible ties within a network, to illustrate the underlying relational structures in our network.

Table 2.3: Interviewed Organizations

Acronym	Orgname	Orgtype	IDC
OPRES	Office of the President	EXEC	0.87
MAF	Ministry of Agriculture and Forestry	EXEC	0.97
MOF	Ministry of Finance	EXEC	0.84
MLHE	Minister of Lands, Housing and Environment	EXEC	0.95
MLGRD	Minister of Local Government and Rural Development	EXEC	0.68
MOPED	Ministry of Planning and Economic Development	EXEC	0.66
MTI	Ministry of Trade and Industry	EXEC	0.71
BSL	Bank of Sierra Leone	PUBAG	0.66
EPA	Environmental Protection Agency of Sierra Leone	PUBAG	0.66
NRA	National Revenue Authority	PUBAG	0.66
SLIEPA	Sierra Leone Investment and Export Promotion Agency	PUBAG	0.79
Stats SL	Statistics Sierra Leone	PUBAG	0.68
APC	All Peoples Congress	LEG	0.39
SLPP	Sierra Leone Peoples Party	LEG	0.45
PCAF	Paliamentary Committee on Agriculture and Forestry	LEG	0.55
DC	District councils	LGVT	0.79
PC	Paramount Chiefs	LGVT	0.89
ALLAT	Action for Large-scale Land Acquisition Transparency	CSO	0.32
GS	Green Scenery	CSO	0.55
ADB	African Development Bank	DONOR	0.68
DFID	Department for International Development of the British Government	DONOR	0.55
EU	European Union	DONOR	0.84
FAO	Food and Agricultural Organisation of the United Nations	DONOR	0.79
IMF	International Monetary Fund	DONOR	0.76
UNDP	United Nations Development Programme	DONOR	0.89
WB	World Bank	DONOR	0.82
WFP	World Food Program	DONOR	0.68
Action Aid	Action Aid	iNGO	0.26
NAMATI	NAMATI	iNGO	0.37
WHH	Welt Hunger Hilfe	iNGO	0.68
SLARI	Sierra Leone Institute of Agricultural Research	RESEARCH	0.47
NU	Njala University	RESEARCH	0.42
DWFC	District Women's Farmers Cooperatives	IG:PROD	0.45
NFFSL	National Federation of Farmers of Sierra Leone	IG:PROD	0.82
SLPMC	Sierra Leone Produce Marketing Company	IG:AGIND	0.55
SLCAB	Sierra Leone Chamber of Agri-Business	IG:AGIND	0.42
SLCCIA	Sierra Leone Chamber of Commerce, Industry & Agriculture	IG:AGIND	0.53
AYV	African Young Voices Radio/Television	MEDIA	0.24
RADIO D	Society for Radio Democracy 98.1 FM	MEDIA	0.39

Source: Calculated by authors from own data.

Figure 2.2: Communications Structure within Sierra Agricultural and Land Policy Network



Source: Own presentation of survey data.

As shown in figure 2.2, the central position within Sierra Leone's land policy domain is occupied by various stakeholders. Among these players are the three most influential ministries (MLHE, MAF, MOF) that drive land reform policies within governmental circles. Additionally, the institution of paramount chiefs - the legal custodians of land under customary tenure - also occupy a central position within this network. Lastly, the United Nations Development Program (UNDP) - the donor organization that largely funded the land reform policy formulation process in Sierra Leone - are also prominent in the communications network. They act as a broker and receive or send information to all the other peripheral blocks in the network. Exchange of expert information within the land reform policy domain in Sierra Leone is also characterized by an intense exchange among the three major blocks (BI1, BI2 and BI6) in the network. It is also characterised by intense exchange of information within all blocks, with the exception of the land reform advocacy block (BI3). Additionally, the donor block, which includes Sierra Leone's leading agricultural research institute- SLARI, is strategically positioned and exchanges a lot of expert information with both the core block and the office of the president.

The Block I3 is made up of stakeholder organizations that advocate for land reforms either because they are in favor of ensuring that the process of large-scale land

acquisition is less cumbersome for foreigner investors or because they want to ensure that the land rights of vulnerable land users are secure and protected in the face of the massive scale of land acquisition. Accordingly, the block consists mostly of stakeholder organizations that advocate for the land rights of small-holder farmers and a public agency in charge of increasing investment in the country, Sierra Leone Investment and Export Promotion Agency (SLIEPA). This block also seemingly plays a peripheral role and connects to the rest of the network through the political core block.

2.5.3 Stakeholders Influence in Policy Formulation

One of the main objectives of this paper is to determine the level of influence various stakeholder organisations have in the policy formulation process. Accordingly, the main questions we set out to answer are: 1) Does the exchange of expert information within Sierra Leone's land reform policy network influence policy makers? and, 2) Does this informational exchange lead to the transfer of some political decision-making power to non-political stakeholders? To answer these questions, our starting point is the derivation of our network multipliers. Network multipliers illustrate the influence various actors have on the belief formation of others. To ascertain the influence profile of the different interest groups in Sierra Leone's land reform policy domain, we excluded own control figures - a measure that explains the extent to which an organization's own information and expert knowledge influences its final policy choice in the formulation and design of land reform policies - and normalized the network multipliers across all stakeholder groups. The results are presented in figure 2.3.

The results illustrate that when own control is excluded, the executive branch of government and donor organizations are the most influential groups in the policy formulation process. The executive highly influences the donor community (54%), public agencies (40%), media organisations (40%), the International Non-Governmental Organisations (iNGOs) (37%), and Civil Society Organisations (CSOs) (33%). Donor organizations also highly influence the policy belief of the executive (34%), public agencies (32%), researchers (31%), agricultural producers (30%), CSOs (30%), and agricultural industry (27%). The network multipliers also illustrate that stakeholder organizations in the agricultural sector, CSOs, and iNGO have little influence on the belief of the main stakeholder groups in the land reform policy domain.

2.5.4 The Belief Formation Process

Measured at the mean, our results in table 2.4 suggest that, after the application of our network multipliers, stakeholders in Sierra Leone's land policy domain overwhelmingly support reforms that are geared towards the establishing of a land title registration system, updating demarcation, surveying and mappings services, strengthening property rights of women and small-holder farmers, and customary governance reform. On issues related to the establishment of a new land administrative framework, strengthening the property rights of foreigners and the taxation of land leasehold fees, stakeholders are willing to countenance some form of reform while maintaining some aspect of the current land administration set up.

Results further indicate that the mean belief of five of the land policy reform variables (customary reforms, establishment of a land title registration system, property rights of women, property rights of large-scale farmers and the property rights of small-holder farmers) change negatively after the exchange of expert information. This signifies high level of support for reform on these issues after communications in the policy network. However, for three of the other reform issues (establishment of a new land administrative framework, taxation on land leasehold fees, property rights

Figure 2.3: Power Outflow after Communications
Source: Calculated by authors from own data.

Table 2.4: Summary Statistics of Policy Beliefs

Policy Beliefs	Beliefs	Mean	SD	Median
NEW_ADMIN_FRAME	Initial	4.0	2.3	3.0
	Final	4.1	1.5	3.8
CUSTOMARY_REFORM	Initial	3.2	2.0	3.0
	Final	3.1	1.4	2.6
LAND_TITLING	Initial	2.1	1.5	1
	Final	2.2	0.9	1.8
MAP_SURVEY	Initial	1.7	1.2	1
	Final	1.8	0.9	1.5
PR_WOMEN	Initial	2.1	1.4	1
	Final	1.9	0.9	1.6
PR_FOREIGNERS	Initial	4.4	2.5	4.0
	Final	4.3	1.6	4.1
TAX_LHF	Initial	5.4	2.2	7.0
	Final	5.2	1.5	5.6
PR_LSLI	Initial	4.4	2.4	5.0
	Final	4.3	1.5	4.5
PR_SHF	Initial	2.4	1.3	2.0
	Final	2.4	0.9	2.4

Source: Calculated by authors from own data

of foreigners and improvement of demarcation, mapping and survey services) the changes in the mean belief of variables are positive after communication, indicating a shift towards maintaining some elements of the status quo on these issues. Additionally, six of the nine median values fall between the ranges of 1.0 and 2.7, while the standard deviation is low for all final beliefs.

However, what stands out from table 2.4 is that mean beliefs do not significantly change after communications. Based on this, can we infer that the exchange of expert information has no effect on final policy choice or is it that any such effect is not apparent through the examination of the mean beliefs? Further investigation reveals three interesting insights.

Firstly, we contend that we do observe drastic changes in the mean beliefs for all the variables after communications because of reported high own control values, an indication that actors rely largely on their organization's own information and expert knowledge in the formulation and design of land reform policies rather than those communicated by other actors. For instance, own control within the executive branch of governments stands at 70%. Since donor and research organizations are normally assumed to be experts and technological leaders, it is therefore expected,

as our results indicate, that the high own control within donor groups (75%) and research groups (79%) confirms this conventional knowledge. This implies that these two groups of stakeholder organizations have high confidence in their own expertise and knowledge and do not change their policy beliefs significantly after communications. However, it is surprising that public agencies, who are also generally regarded as a technical group of experts in government, report a modest own control of 54%. The results also indicate that stakeholder organizations most receptive to information from other stakeholders are public agencies (54%), local government authorities (51%), CSOs (59%) and iNGOS (57%).

Secondly, as can be seen from figure 2.4, the belief changes that occur at the group level after the application of our network multipliers seem to have a counter balancing effect. This is perfectly summed up by the changes at the group level for two of the most influential groups in our network. For instance, donors who are overwhelming in favour of reforms before communications shift their policy position towards retention of the old institutional set-up. On the other hand, the executive who mostly lean towards maintaining current land administrative arrangements shift towards supporting reforms on all but one of the policy issues. This pattern is apparent across all the different interest groups in our study.

2.5.5 Communication Networks as Consensus Building Mechanisms

Thirdly, while at first glance the impact of communications on the policy position of actors may seem infinitesimal, a close examination of the data reveals that communication does in fact act as a consensus building mechanism in the policy formulation processes. To demonstrate this, we evaluate the impact of a large number of policy instruments in our study on different policy outcomes by reducing the complexity in the data. We reflect this reduction in complexity using a principal component analysis, a method suitable for the extraction of a lower number of unobserved uncorrelated variables from observed correlated variables.

Our results predict that the nine policy instruments can be summarized into two broad policy reform goals. These results are presented in figure 2.5. The first component is labelled as a continuum which depicts support for state-driven reforms versus market-driven reforms. This is because, firstly, most of the policy issues associated with market-driven reforms (support for lower taxes, strong property

rights of foreigners, support against reforms that promote monopolistic competitions that are associated with strengthening the rights of large-scale land investors) project relatively highly on the first component.

Secondly, policy issues associated with state-driven reforms (support in favour of higher taxes and a monopolistic large-scale land investor model, and support against reforms that strengthen the property rights of foreigners) project lowly on the first scale. Higher values on this component are, therefore, an indication that an actor supports market-driven reforms. The second component is labelled as a continuum which depicts support for the retention of old land administrative arrangements versus support for reforms that adopt new land administrative arrangements like the establishment of a land registration and titling system, upgrade of land demarcation, mapping and survey services, and the establishment of a new land administrative framework. Higher values on this component is an indication that an actor prefers institutional reforms over the current land administrative institutional set-up.

From figure 2.5, three clusters can be clearly identified. Firstly, on the bottom left of the figure are members of the executive branch of governments who are largely in support of state-driven reforms but not keen on institutional reforms of the current land administrative systems in place. On the opposing end are donors and civil society organisations who are largely in favour of market-driven reforms and institutional reforms of the current land administrative systems. Lastly, on the top left of the graph, we can also identify members of the legislation, local government authorities and the media as a third cluster. They support state-led reform programs and all but one of the current land administrative systems, that is, customary land governance reform. Opposition to reforming of customary land governance reform is expected within this group because, its composition includes paramount chiefs and other local authorities who currently hold administrative powers and authority over all customary land.

While our results in table 2.4 suggest that at the macro level we do not record large enough shifts in policy positions after the application of our network multipliers, figure 2.5 demonstrate that communications do in fact lead to convergence in our policy network. On the whole, arrows point, for each dimension, predominantly in the direction of one policy position suggesting that communication builds consensus among actors in Sierra Leone's land policy domain, even if it does not result in actors sharing or adopting the same policy position after communications.

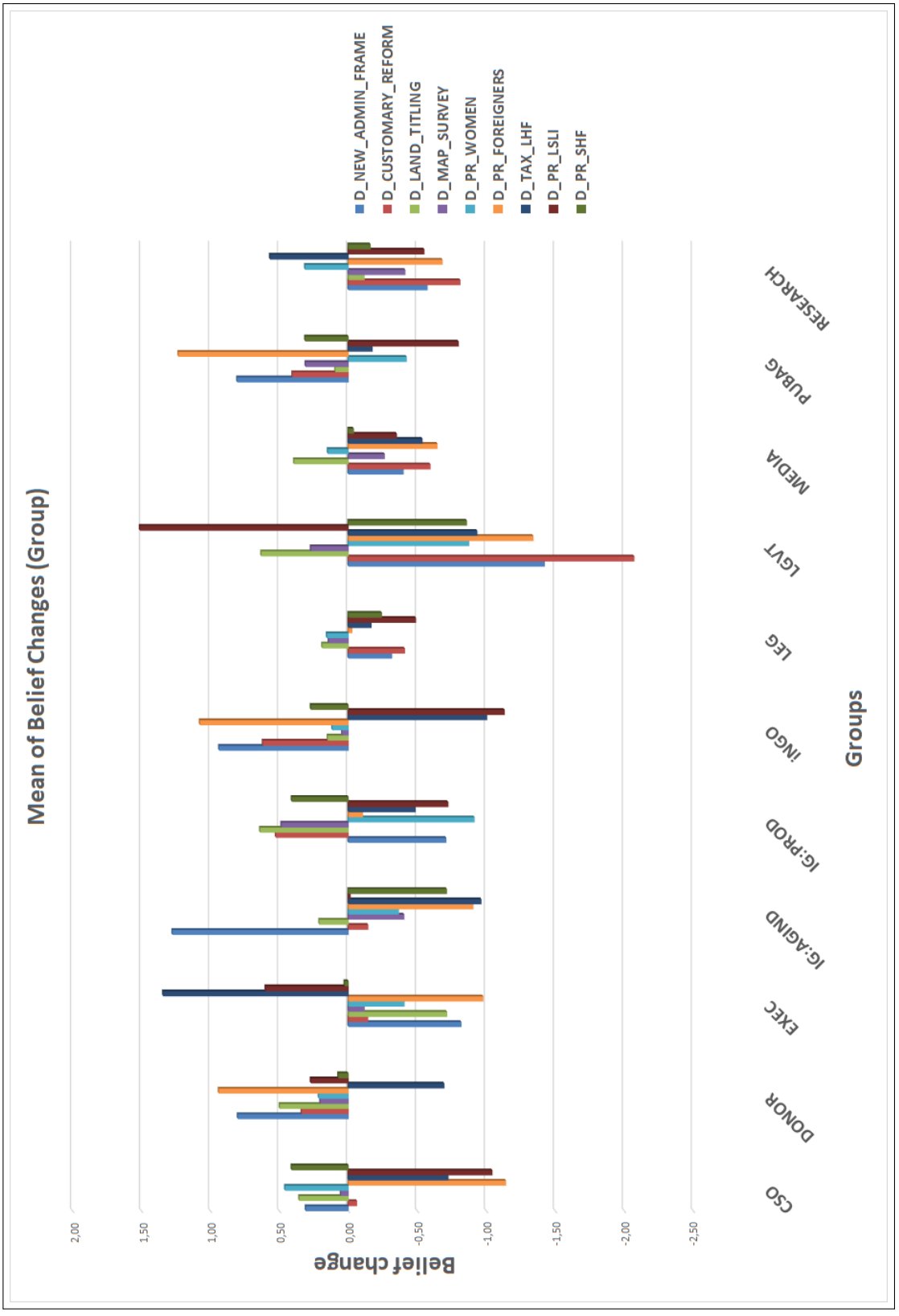


Figure 2.4: Mean changes of belief after Communications
Source: Calculated by authors from own data.

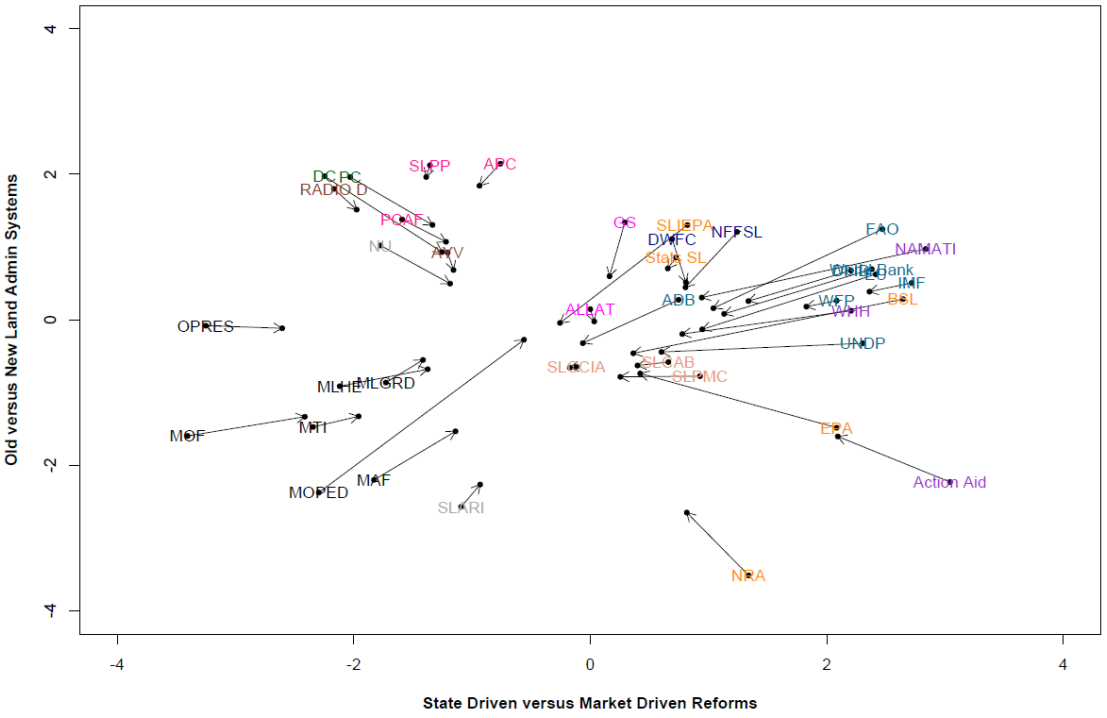


Figure 2.5: Consensus building regarding land reform policies
Source: Calculated by authors from own data.

Clearly, as the results show, all actors compromise on their initial positions after communications. The executive branch of government compromises on its initial pro-state led and pro-retention of old administrative systems policy positions and move towards market led reforms, while accepting the need for reform of the old administrative set up after the exchange of expert information within the policy network. Donors and Civil Society Organisations, on the other hand, compromise on their initial market reform positions, albeit remaining convinced of the need for the reform of land administrative reforms. Local government authorities and legislators also accept the need for some form of reform of the customary governance system and move towards market-led reforms after communications.

The direction of belief updating for each actor i for each policy strategies d in our graphical representation is computed using the representation below:

$$DIR_{di} = (P^*_{di} - P^0_{di})P^0_{di} \tag{2.7}$$

Where P^0_{di} represents an actor's initial policy position, and P^*_{di} represents an actor's policy position after belief updating.

After an application of our network multiplier, a negative difference between the policy positions of actor i and actor j indicates convergence to a common point after belief formation. Consider that a negative difference between initial and final policy positions after communications results in either of these two cases: i) $P_{di}^0 > 0$ and $P_{di}^0 > P_{di}^*$, or ii) $P_{di}^0 < 0$ and $P_{di}^0 < P_{di}^*$. This signifies that the difference in the final policy position between stakeholder organisations decreases with communication, even if their initial positions remain heterogeneous. Given that an overwhelming majority of the calculated belief formation directions are negative for both components, it implies that policy positions converge towards a common point after communications for both components, indicating that the exchange of expert information builds consensus for land reform policies in Sierra Leone. It further demonstrates that the convergence of policy positions in our model is not a presupposition. Rather, it shows that stakeholders in our network are open to updating their policy beliefs based on information they receive from other players in the network.

2.5.6 The Political Power Behind Knowledge Transfer

As has already been highlighted, before communications, only political agents with formal constitutional responsibilities and political power could, in principle, influence final policy choice. However, through their participation in the policy network and because of the valuable expert information they provide, stakeholder organizations who originally have no formal political power are able to interact with political agents with formal political power and influence final policy choice. In essence, they provide political agents with the valuable information that shape their policy beliefs and the political agents, in turn, give up (or transfer) some of their generalized decision making power to these stakeholder organizations to influence policy formulations. In our study, we analyse the amount of generalized decision making power an actor gains due to his participation in the elite communications network by combining the network multiplier with the Banzhaf power indices to measure the power outflow that results from the exchange of expert information. We present the result that demonstrates the political power behind knowledge transfer in figure 2.6 for two of the most realistic institutional arrangements in Sierra Leone, the Duo and the Duol scenarios. These two scenarios, along side others, have already been outlined in section 2.4.2.

Our results indicate that before the exchange of expert information in the case of the DUO scenario, power resides entirely with the executive. After communications, the

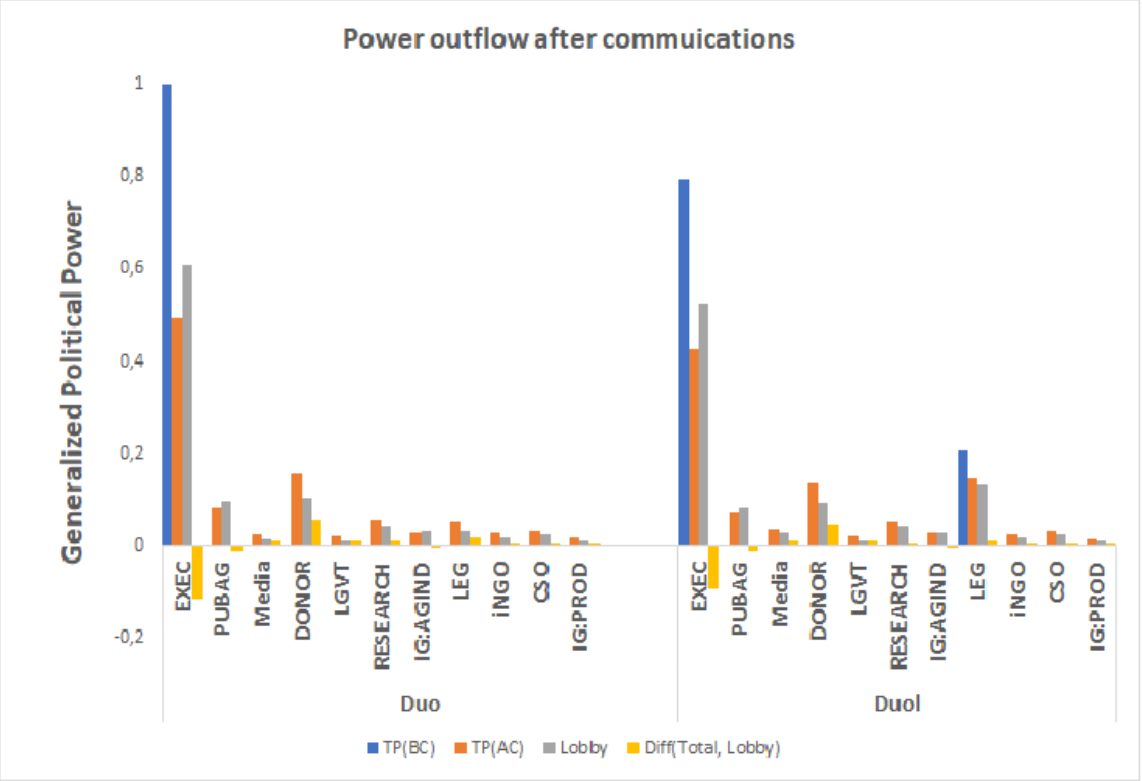


Figure 2.6: Power Outflow after Communications
Source: Calculated by authors from own data.

presidency gives up a little over 60% of its power to influence policy formulations. The bulk of this generalized decision-making power is passed on to donors (15.7%), public agencies (8.6%) and research organizations (5%). Both International iNGOs (2.9%) and CSO (3%) have little generalized power, while the others have almost no influence in the policy formulation process. In the second scenario (DUOL), we consider the case where the legislative decision-making power is shifted among MLHE, the President, and the leading party the SLPP through its Members of parliament. Here, our results show a different power dynamic. It indicates that before communications, power is shared between the presidency (79%) and parliament (21%). After communications, generalized power largely flows to donors (13%), public agencies (7%), and research organisations (5%). However, even after the power outflow, the executive branch of government (43%) and the legislative (15%) still remain the stakeholder organizations with the most generalized power in the network.

Furthermore, our results suggest that most of the generalized power of donors, public

agencies and researchers largely comes from the knowledge they provide to other network members during the information exchange process. Parliament's power does not increase significantly in the first case and reduces slightly in the second case after communications. This might be because of their embeddedness in the communications network. In line with their low influence over the belief of stakeholders, agricultural interest groups, CSOs and the media have very limited influence in the land reform policy program in Sierra Leone. Overall, the executive branch of government and donors remain the most influential stakeholder organizations in the policy formulation process after informational exchange.

2.5.7 Final Policy Choice

Based on our theoretical framework presented in sections 2.1 and 2.4, we calculate the final policy choice using results from our modified Baron-Ferejohn legislative bargaining model and belief formation model. Final policy choices are calculated for the respective country-specific legislative scenarios presented in table 2.2.

As shown in figure 2.7, our results indicate that, on the one hand, the outcome of the policy formulation process result in stakeholders opting for final policy choices that are in favour of reform of policies related to land property rights of women *(a.y.gender)*, land property rights of small-holder farmers *(a.y.smallholder)*, the introduction of land demarcation, mapping and survey services *(a.y.survey)*, and the establishment of a comprehensive land title registration system *(a.y.titlesregis)*. On the other hand, they largely opt for a policy choice that maintains the status quo on policies related to the establishment of a new land administrative framework *(a.y.adminframework)*, property rights restriction for foreigners *(a.y.restriction)*, and taxation of land leasehold fees *(a.y.taxation)*. In relation to policy choices related to customary land governance reform *(a.y.govreform)* and land property rights of large-scale land investors *(a.y.largescale)*, stakeholders opt for policies that partly support reform while maintaining some components of the status quo.

Our results in figure 2.7 also indicate that irrespective of who leads the policy setting agenda, final policy choice in favour of reform are identical under all legislative policy scenario. However, there is are slight variations in the choice of final policy under the various scenarios when policy choice is not in favour of a wholesome reform. In this case, when agenda setting is led by the President (PRES) and jointly by the presidency and Ministry of Lands (DUO), they are more likely to opt for more reform. On the contrary, when agenda setting is characterised by

party leadership (PRESPARL and DUOL), they are more likely to lean towards maintaining the status quo. One explanation that can be given for the latter is that political considerations that acknowledge the political importance of traditional authorities like the chief becomes an important factor in the decision making process.

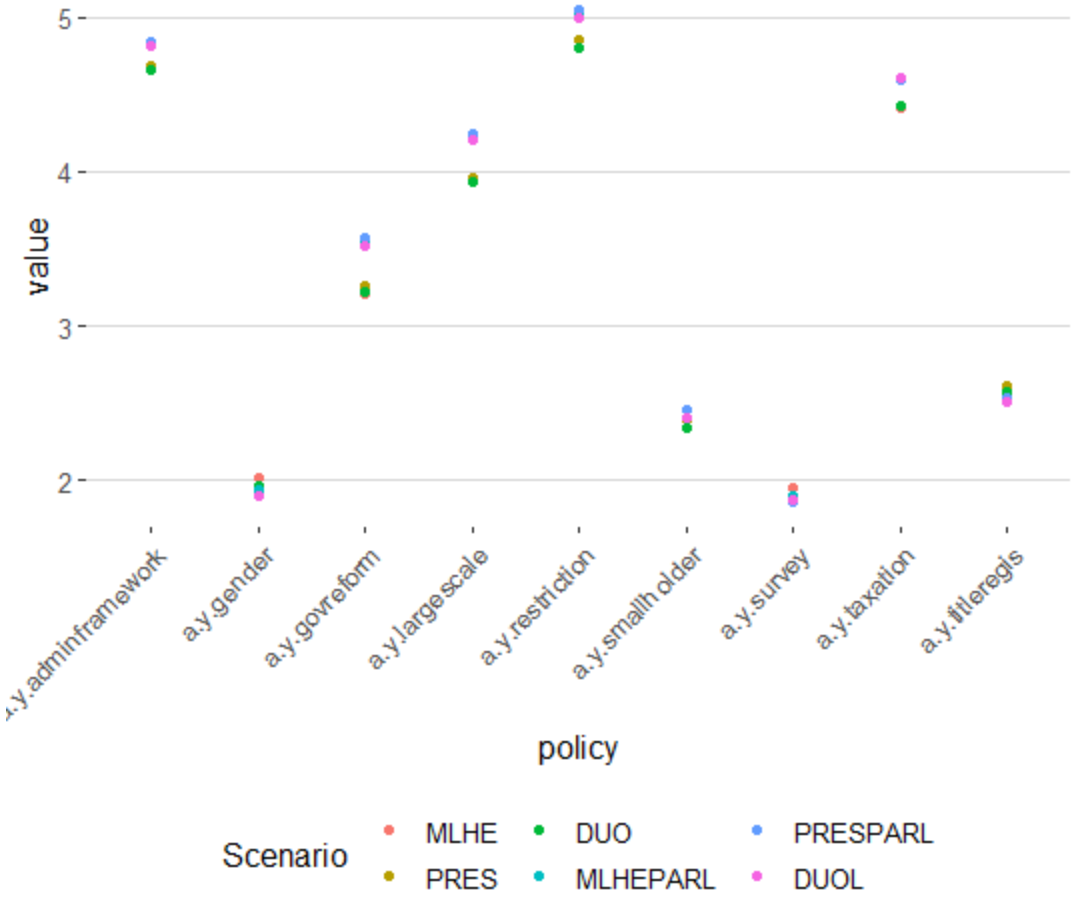


Figure 2.7: Final Policy choice after Communications
Source: Calculated by authors from own data.

2.6 Conclusion

In the wake of the new wave of large-scale land acquisition in the global South, both critics and proponents have suggested the need for land reforms to strengthen property rights and stakeholder engagements to promote policy ownership in order to prevent the forceful eviction of vulnerable land users that have come to characterize these acquisitions. In this paper, drawing on a land reform program based on stakeholder engagements in Sierra Leone, we examine the underlying political economy issues that drive the choice of related land reform policies, and analyse the role of policy beliefs and the exchange of expert information in policy networks. Specifically, we combine Friedkin and Johnsen (1990)'s belief formation model with that of Baron and Ferejohn (1989) and Grossman and Helpman (1996)'s legislative decision-making model to analyse the land reform policy formation process in Sierra Leone. This combination allows for the identification of the communications structures and the quantification of the effect of the exchange of expert information on the choice of land reform policies in the context of large-scale land acquisition.

Our analysis shows that the exchange of expert information within the Sierra Leone's land reform policy space is dense and very structured. In relation to the policy belief formation process, our results indicate that donors, the executive branch of government, public agencies and to a lesser extent, research institutes have a huge impact on influencing the policy beliefs of other actors. The main policy beliefs, as it relates to either reforming current land laws and administrative structures or maintaining the current status quo, did not significantly change as a result of the exchange of expert information within the policy network. This is because key stakeholders in the land policy domain largely rely on their own control even though they update their policy beliefs, after communications. However, exchange of expert information results in consensus building and bridges differences in policy beliefs. Additionally, our results show that land titling, customary governance reform and the strengthening of demarcation, mapping and survey services are reform programs that are widely supported across the board by all stakeholders. Thus, the government should consider emphasizing these specific issues during any reform program before moving on to other slightly more contentious issues like the property rights of foreigners, property rights of large-scale farmers and the property rights of women. Our results also indicate that through the exchange of expert information, political agents give up some of their decision making power to non-political actors like donors to influence final policy choice.

Unlike other social influence models, we make no prior assumptions about the weights placed on the belief of others in our belief formation models. We rather empirically collect and measure them. We also acknowledge that there are some limitations to our results. In the first place, while we have employed a theoretically founded model in our study, we make no conclusions about how efficient the policy formulation process is in relation to whether it results in the choice of the most efficient land reform policies or not. Additionally, we concede that our measurement of initial belief has some limitations. Our assumption is that some communications about the different land policy reform issues have occurred within the communications network. However, there is no certainty that our reported beliefs are either the initial or final belief or simply a bit of both. We, therefore, emphasis that our application of the network multiplier should be regarded as a simulation exercise and not a forecast. However, by measuring the communications structures and quantifying the effects of communications on final belief, we are satisfied that our empirical paper contributes to an understanding of the land policy formulation process in Sierra Leone.

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Chapter 3

Policy Networks as Determinants of Land Policies in Sierra Leone: An Exponential Random Graph Modelling Approach

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Abstract

Large-scale land acquisition and its role in alleviating poverty and increasing rural incomes remains one of the most contentious issues in international development. These land transfers, from mostly small-holder farmers to large-scale farm investors, have sometimes been characterised by acrimonious disagreements between land-users and human rights advocates on the one hand, and local and central governments and investors on the other hand. To address these contentions, stakeholder engagements and participatory policy processes have been promoted as an important tool in the design and implementation of policies because of its propensity to foster inclusivity and policy ownership. However, while both stakeholder engagements and participatory policy processes have been widely discussed in the political economy literature, there is scanty empirical evidence about the extent to which they influence and drive the choice of policies. Our paper contributes to this literature by employing a policy network-based approach and a Bayesian estimated Exponential Random Graph Model (ERGM) to assess the extent to which stakeholder engagements and participatory policy processes drive the land policy formulation process in Sierra Leone. The results indicate that donors highly influence the stakeholder engagement process. Additionally, organisations rely on one another to determine the trust-worthiness of an information source and providers of political support.

Keywords: Land grabbing, policy processes, stakeholder engagements, policy networks, network estimation, exponential random graph models

JEL Codes: Q15, C54, D83.

3.1 Introduction

At the turn of the century, the increase in investments and acquisitions of large tracts of land, particularly in the developing world, became one of the most topical issues in development circles. Many proponents have opined that such a large-scale investment in the agricultural sector is needed to attract new actors and capital in an investment starved agricultural sector in developing countries Byerlee and Deininger (2011); Deininger and Xia (2016); Boamah (2011). This, it has been argued, will contribute to improving the precarious livelihood situation of the rural poor through the creation of new employment opportunities, and serve as an additional source of revenue and foreign exchange earnings for cash strapped governments (Anseeuw *et al.*, 2011; Hallam, 2011; Zoomers, 2010). Others have been critical of this new phenomenon because of the potential risk of displacement of local small-holder farmers, loss of grazing land for pastoralists, and loss of income for local communities that could result from such land transfers (Nalepa, 2011; De Schutter, 2011). As Borras and Franco (2013) would later observe, because of the unequal power relation between small-holder farmers and the mostly foreign investors, the term "land grabbing" became synonymous with the acquisition of huge tracts of land leading to the displacement and expulsion of people from their land, with little consideration for the impact it will have on their livelihoods

One country where large-scale land acquisition has been prominent is Sierra Leone. At the end of a decade long civil war that left its economy battered (Keen, 2003), the country's post-war government focused on attracting foreign direct investment into its decimated agricultural sector where over two-third of its populations were employed (Maconachie, 2008). To attract agri-business investors, the government claimed that only 15 % of the country's 5.4 million hectares of arable land had been used and the rest were idle and available for acquisition (SLIEPA, 2010). It also granted complete exemptions from tax and payment of import duties (Baxter and Schaefter, 2013). At an investment forum conveyed in the United Kingdom in 2009, Sierra Leone's then president wowed investors by claiming that "Our soils are fertile and our land under-cultivated, offering ideal conditions for new investments in rice, oil palm, cocoa, coffee and sugar" (Koroma, 2009). Consequently, between 2009 and 2012, it was estimated that about one-fifth of the country's arable land was leased to foreign investors (Baxter and Schaefter, 2013).

While the Sierra Leone government went out of its way to promote large-scale land acquisition, few, if any, would have predicted the complexity and difficulties the

country's existing land tenure and administrative systems would pose for foreign investors. In particular, the restrictive nature of the country's customary land tenure system, and its land laws that prohibit foreigners from outright land ownership, the lack of a national land registration system and the resulting tenure insecurity, coupled with obsolete land administrative systems all added various layers of complexities that resulted in legal uncertainties (Moyo and Kamara, 2009; Renner-Thomas, 2010). Some have suggested that these issues, among others, led to forced evictions of small-holder farmers, who were not part of the land transfer negotiations and hence unwilling to give up their land (see for example Green Scenery, 2011; Melsbach and Rahall, 2012; Christian Aid, 2013; Ochiai, 2017). The forced evictions, a phenomenon that would later become commonly referred to as land grabbing (Daniel and Mittal, 2009; De Schutter, 2015), intensified calls for a reform of the country's land administrative and tenure systems. On the one hand, proponents of large-scale investment in agricultural land have supported calls for land reform in a bid to introduce titling, strengthen tenure security, and eliminate the cumbersome land transfer process to ensure that the most productive actors can easily have access to land (Johnson, 2011; SLIEPA, 2010). On the one hand, opponents like civil society organizations and other interest groups, led calls for the reform of land laws and regulations to strengthen the tenure security and property rights of small-holder farmers and other vulnerable land users, through a land title registration system (Baxter and Schaefter, 2013; Green Scenery, 2011).

Even though attempts to reform Sierra Leone's current complex land laws and administrative system has been a pipe dream for a long time, the difficulties faced by foreign investors to acquire land and the increasing wave of investment that resulted in the displacement of small-holder farmers in the country accelerated the need to reform the current land administration and rights management systems (Ochiai, 2017). When a land reform programme was abandoned in 2005 because of a lack of stakeholder participation and inclusivity, in 2009, a new land reform program made stakeholder involvement a cornerstone of the process. Under the auspices of the country's Lands and Country Planning Ministry, and with donor funding from the United Nations Development Program (UNDP) and the German Ministry of Development Cooperation (BMZ), a multi-stakeholder platform that included government officials, local and international researchers, policy experts, development partners, donors, women's groups, and traditional authorities all came together to formulate a comprehensive national land policy that would make land transfers less cumbersome, while also protecting the land rights and tenure security of small-holder farmers. This process culminated into a National Land Policy document which was

officially launched by Sierra Leone's then President, Ernest Bai Koroma in March 2017. The main objective of the land reform policy document was "to move towards a clearer, more effective and just land tenure system that shall provide for social and public demands, stimulate responsible investment and form a basis for the nation's continued development" (Ministry of Lands Country Planning and the Environment, 2015).

What became clearer during the land reform policy formulation process was that, like many other policy formulation processes (see Henning *et al.*, 2018, for more on the Comprehensive African Agricultural Development Program policy formulation process for instance), stakeholder organisations had heterogeneous policy positions. On the one hand, some stakeholders, particularly those in government circles, strongly believed that small-holder farmers are inefficient and the most effective way to alleviate poverty is to transfer land from small-holder farmers to supposedly more productive and efficient large-scale farmers in a bid to increase food production and combat poverty and food insecurity (Ministry of Agriculture Forestry and Food Security, 2009). On the other hand, others, particularly interest groups like civil society groups and farmer organisations, are convinced that small-holder farmers are poor, vulnerable and the mainstay of our food systems. As a result, they have argued that removing them from their land will only worsen food insecurity and deprivation (FIAN International, 2016; De Schutter, 2011; German *et al.*, 2011). These heterogeneous policy views underscore both the complexity inherent in the policy process and the importance of policy beliefs in the policy formulation process.

Generally, to navigate some of the complexities in the policy formulation process highlighted above, stakeholders rely on naive mental models to understand the relationship between certain policy positions and how they might translate into outcomes (Caplan, 2001; Akerlof, 1989). If these mental models, also known as policy beliefs, are grounded in sound data and economic basis, then final policy choices are likely to be efficient. However, if they are based on faulty reasoning, then they are likely to result in inefficient and incoherent (Caplan, 2007).

While a lot of studies about large-scale land acquisition has been undertaken in Sierra Leone, they have largely focused on its effect on rural livelihoods (see e.g. Millar, 2016; Yengoh *et al.*, 2016; Bottazzi *et al.*, 2016; Ochiai, 2017; Lustenberger, 2016, for some previous analysis of the effects of large-scale land acquisition on rural livelihoods in Sierra Leone for instance). However, what remains mostly unexplored is the role of political institutions, policy beliefs and the underlying political processes that results in the choice of policies that drive large-scale land acquisition. To the

best of our knowledge, a quantitative evaluation of the underlying stakeholder policy processes that determine the choice of specific land-related policies is missing.

Drawing on previous studies that have highlighted the role of special interest groups, donors and other stakeholders in the agricultural policy formulation process in Sub-Saharan Africa (Birner and Resnick, 2010; Henning *et al.*, 2018; Bates, 1981), our paper quantitatively analyses the stakeholder policy formulation process that resulted in the formulation and adoption of Sierra Leone's National Land Policy (Ministry of Lands Country Planning and the Environment, 2015). Given the importance of information diffusion and policy beliefs in policy networks, the extent to which network structures influence the behaviour of political agents in policy processes is instructive. To this end, our paper considers the manner in which information is propagated through a policy network during stakeholder engagements, and the extent to which agents' opinions and behaviours are influenced by other agents in the policy network (Siciliano, 2015; Malkamäki *et al.*, 2019; Berardo and Scholz, 2010). In this regards, we note that studies that have attempted to undertake a political economy analysis of large-scale land acquisition have so far failed to examine how specific policy network structures impact the choice of land policies and how the various stakeholders' opinions, policy beliefs and behaviours are influenced by other stakeholders in the policy network (Krieger and Leroch, 2016; Lavers, 2012; Chakravorty, 2016; Hall, 2004; Baumann, 2013; Aabø and Kring, 2012; Scurrah *et al.*, 2015). To the best of our knowledge, there are currently no empirical studies that estimate the impact of network structure on the choice of specific land policies.

We attempt to fill this gap by examining the underlying factors that drive the land reform policy process in Sierra Leone. Accordingly, we ask the following questions: What are the impacts of policy beliefs and exchanges of expert information and political support within Sierra Leone's land policy network? Are informational exchanges and political support within Sierra Leone's land policy network driven by structural factors like mutuality and transitivity or personal organizational attributes like similar policy views, perceived political expertise, influence or credibility of organizations?

On a methodological level, our theoretical analysis is based on a framework of informational lobbying where interest groups seek to influence final policy choice in two ways. First, through the exchange of expert information and second through the provision of support for politician's re-election bids (Henning *et al.*, 2018). To this end, our paper makes two contributions to the political economy literature on large-scale land acquisition. Firstly, we enhance our understanding of the underly-

ing political processes that result in the choice of specific land-related policies by empirically quantifying the influence structures within Sierra Leone's land policy domain. Secondly, we employ a network-based approach and a Bayesian model of Exponential Random Models (ERGM) to assess the network generating processes and the factors that drive these processes.

The rest of this paper will have the following structure. After this introductory section, the next section reviews the literature on the factor that drives policy networks. The theoretical and framework used in the study are described in the succeeding section. This will be followed by a description of the data collection method. The empirical results of the study are then presented, followed by discussions and concluding remarks.

3.2 Literature Review

3.2.1 Antecedents of Communications and Political Support Networks

Policy networks are largely formal and informal organizational structures where actors have the opportunity to choose who they communicate with. Thus, the social context within which political communication occur significantly affect the manner and speed of learning that happens within networks. It is therefore plausible to assume that network structures play a role in determining the influence individual organizations have on the policy beliefs of policy makers and their choice of final policy decisions. In their examination of the factors that influence exchanges in policy networks, Henning *et al.* (2019) suggest that organizations compare their expectations of the value and usefulness of the information they seek against the cost of obtaining that information. This indicates that informational exchange is not entirely driven by the demand for information but also by the cost of accessing the information and the risk that an informational exchange partner will engage in opportunistic behaviour, giving rise to transaction costs (Moody, 2001). Accordingly, following Wassermann and Faust (1994) and Henning *et al.* (2019), we examine informational exchanges in policy networks through the prism of transaction costs and opportunistic behaviour. To this end, our study proposes two main determinants of political support and communications network. These are; actor specific attributes and structural attributes. In the former, we propose that the formation of ties is

preference driven while in the latter, we argue that structural properties inherent within policy networks drive network formation

3.2.2 Organisational Specific Attributes

One of the main reasons why organizations demand information is to update their understanding of how certain policies work and reduce the uncertainty of policy bias inherent in the policy formulation process. Also, in the process of deciding with whom informational exchange relationships should be established, organizations tend to consider specific organizational attributes. One of such attributes includes the trustworthiness of a would be exchange partner (Leifeld and Schneider, 2012; Henning *et al.*, 2019). Trust in this case is associated with the likelihood that an organization will not behave opportunistically in the information exchange process. The determination of trustworthiness largely depends on actor specific attributes of the sender or receiver of the information. Among others, these attributes include; the perceived influence and expertise of the organization involved, the existence of previous or current network ties, and policy or preference homophily (Siciliano, 2015; Lee *et al.*, 2012).

Perceived Influence of Organizations

Since lobbying is primarily an interest mediation mechanism, interest groups prioritize contact with organizations that are highly influential in the policy formulation process. Similarly, knowledge-based organizations like research institutes and donor organizations target politicians that are influential in the policy formulation process. Nonetheless, because establishing contacts and gaining access to powerful political actors is non-trivial, stakeholder organizations are inclined to use middlemen and brokers to indirectly access influential political actors they cannot directly access. Accordingly, stakeholder organizations tend to seek informational exchange relationships with organizations that are perceived to have high connections and political influence in the policy formulation process (Weible and Sabatier, 2005; Huckfeldt *et al.*, 2005; Knoke *et al.*, 1996).

We use perceive influence instead of formal political power as a measurement variable for a couple of reasons. First, as Shepsle and Weingast (1987) contend, observed power distributions are not only limited to formal institutional rules but also informal institutions, particularly so in Sub-Saharan Africa. In the policy formulation process

for instance, even though there are clearly laid down rules and regulated procedures spelt out in a country's constitution, political agents informally delegate agenda setting power on specific policies to certain ministries or public agencies. Second, as Bratton (2007) argues, the rule of law is very weak, if not entirely non-existence, in the developing world. Under these circumstances, one of the most prominent informal institutions that significantly influence many aspects of political decision making in Africa is the "Big Man" presidentialism. The "Big Man" presidentialism typifies a situation in which formal institutions and laws are secondary and instead political power becomes highly personalized and concentrated around the presidency, leading to an increasing political power in the hands of the president and his or her cabinet (see also Van de Walle, 2001). In this context, therefore, perceive influence captures both formal and informal political power. Accordingly, we formulate the following hypothesis:

Hypothesis 1A: *Actors set out to minimize the transaction costs of exchange of expert information by establishing communications tie with actors they perceive as influential in the policy domain.*

Hypothesis 1B: *Members of the executive branch of governments are perceived as the most influential members in a policy network domain and hence are the most sought-after stakeholders.*

Organizational expertise

Since policy-makers may not be fully aware of the impact that different policy instruments have on the welfare of society because of the complex relationship between policy choices and their political outcomes (Caplan, 2001), one of the critical challenges they face is to evaluate the set of policies that work best. They, therefore, rely on communications and interaction with other members in their policy network to update their knowledge on various policy options. In addition to political influence, the possession of high quality and unbiased information increases an organization's influence in the policy formulation process within policy networks. To be perceived as a reputed expert in a specific field, organizations spend huge portions of their resources to acquire the required expertise needed to proffer well-informed policy advice to policy makers. Scientific organizations like research institutes for instance are perceived as sources of high quality and unbiased information. Expert information and policy proposals from such organizations are also highly sought after by organizations who might also use them in their own informational exchanges and

lobbying activities because it enhances their reputations. It is, therefore, reasonable to assume that organizations have a tendency to seek information from donors, and research and scientific organizations based on their perceived expertise in providing high-quality information about policy options (Sabatier and Jenkins-Smith, 1993).

Hypothesis 2A: *Organizations are more likely to seek information from organizations renowned for their expertise on policy issues (research organisations, donors)*

Hypothesis 2B: *Research organizations tend to send expert information*

Homophily

The likelihood that shared views leads to the establishment of an exchange relationship is referred to as homophily (Lee *et al.*, 2012; Goodreau *et al.*, 2009). Since trust in information increases when actors have shared or similar world view, to deter opportunistic behaviors, organizations are inclined to establish communication ties with other organization with whom they share a common world view (Carpenter *et al.*, 2004; Buskens, 2003). Preference and policy homophily thus tend to increase the chances of tie connections since organizations equate shared policy and preference similarities with trust. Additionally, homophily is likely to reduce the transaction costs of tie formation because it makes future collaborations and informational exchanges a lot easier between organizations (Cook and Whitmeyer, 1992; Lee *et al.*, 2012). Furthermore, homophily is a potent form of social control that scrutinizes shared partners to prevents opportunistic behavior (Henning *et al.*, 2019). Moreover, information from sources with identical ideologies or world view will likely reduce the possibility of receiving information that is unwarranted or unexpected (see Festinger, 1954, for example).

Hypothesis 3: *Organizations with similar policy preferences and positions tend to share political communications and support relationships.*

Existence of Previous or Current Network Ties

Another factor that drives tie formations in policy networks is the existence of current or previous relationships between actors. In the case of communications and political support networks, following from Leifeld and Schneider (2012), we assume that in an effort to reduce the transaction costs of tie formation, organizations that already have existing or previous informal social relationships or other informational

exchange ties are likely to establish further political support exchange relationships and vice versa. This is primarily because the establishment of an additional exchange relationship incurs no extra cost

Hypothesis 4: *Organizations that already have informal social relationships have a higher propensity to establish further informational exchange and political support relationships and vice versa.*

3.2.3 Structural Effects of Network Determinations

In addition to organizational attributes, because of dependencies between and among actors and organizations, structural effects of policy networks contribute to network tie formations (Siciliano, 2015). Empirical evidence suggests that not accounting for structural dynamics and instead presuming that network ties are independent can result in unreliable findings (Krackhardt, 1987). To this end, in this sub-section, we discuss some of the structural factors that influence network tie formations in our policy network.

Reciprocity

A lot of organizational interrelations are bi-directional in nature such that organization A may solicit information from organization B. Reciprocity describes the likelihood that the receiver may also respond such that organization B also solicits information from organization A. According to Siciliano (2015), there are a several reasons why reciprocity is common in policy networks. Firstly, organizations are more likely to reciprocate when they seek information in order to reduce the propensity of being denied expert information in the future. Secondly, reciprocity is prevalent in policy networks because of the likelihood that other organizations may simply end exchange relationships with unreciprocated ties. Lastly, reciprocation reduces the uncertainly about the biasedness of the source and content of received information. We, therefore, propose that reciprocity is a fundamental driver of tie formations in policy networks.

Hypothesis 5: *Organizations tend to reciprocate when they receive information from others.*

Transitivity

As earlier stated, organizations go to lengths to prevent opportunistic behaviours inherent in policy networks. One way they discourage opportunistic behaviour is by establishing communication ties with other organization with whom they share common partners. This is because trust in the information provided generally increases when actors have shared partners (Dixit, 2003; Henning *et al.*, 2012). In this case, scrutinizing shared partners is a form of social control that prevents opportunistic behaviour. Accordingly, policy networks tend to display patterns of transitivity, implying that informational exchanges increase between two organizations if a third party serves as a bridge (Berardo and Scholz, 2010).

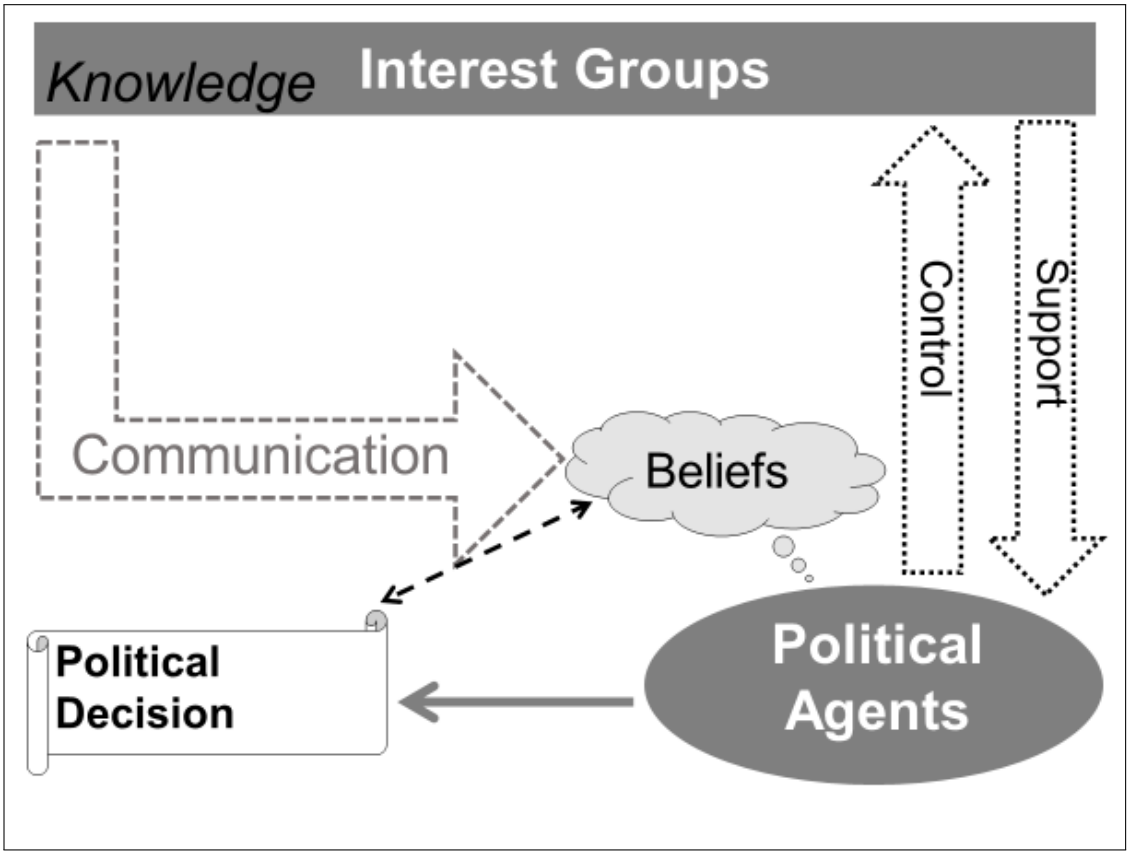
3.3 Theoretical Framework

Following Henning *et al.* (2019), our theoretical framework, presented in figure 3.1, draws on the classical theory of interest groups. While interest groups are formed to primarily seek the interest of their members (Olson, 1965; Becker, 1983), politicians are overwhelmingly driven by the desire to acquire or remain in power (Grossman and Helpman, 1996; Downs, 1957). Generally, in order to influence policy choices that favour the interest of their members, interest groups influence political agents through two principal channels; communicational and classical lobbying. In the former, interest groups influence certain policy choices by supporting the (re)election bid of politicians in exchange for a say in the choice of, or enactment of, certain policy choices that benefit the interest of their members. Accordingly, in situations where they diverge, politicians must make a trade-off between the preferences of the electorate and that of interest groups that support their (re)election bids. This classical lobbying theory is generally referred to as a "vote-buying mechanism" because interest groups provide material resources to politicians in exchange for the power to influence certain policy issues (Grossman and Helpman, 1996).

Additionally, interest groups influence the policy formulation process through what Henning *et al.* (2019) refer to as informational lobbying. Since politicians may not fully understand the complex relationship between policy choices and their outcomes, they resort to relying on mental models, also known as policy beliefs, to minimize this complexity. Based on these policy beliefs, they map the transformation of specific policy choices into an intended outcome. Because of this imperfect knowledge gap, political actors update their policy beliefs through informational ex-

change and communicational learning with experts or interest groups (Acemoglu and Ozdaglar, 2010). Through this informational exchange, interest groups influence the policy-making process by ensuring that during communication with politicians, their knowledge about specific policy instruments forms part of the factors that influence the final policy choices of politicians.

Figure 3.1: Political Process Framework.



Source: own illustration based on Henning *et al.* (2019)

As can be seen from the arrows in figure 3.1, interest groups influence final policy choice either through support in the form of campaign finance to political parties or by sharing expert information with political agents through communications. Through the latter, political actors update their existing *policy beliefs* to enhance their understanding of how policies translate into intended outcome. Based on our model, political agents and interest groups are also able to share information with others and update their policy beliefs on specific policy issues. Hence, our model describes a political exchange mechanism that is typical in policy networks (**?**Henning, 2000, 2009).

Accordingly, we define an actor set N, consisting of political agents set G and Interest groups set Q. Let n denote the number of actors, and M^S the $n \times n$ adjacent matrix, where $m^s_{ij} = 1$ indicates that actor i supports actor j. Following (Henning *et al.*, 2019), we calculate the support multiplier matrix $\hat{M}^S$:

$$\hat{M}^S = [\mathbf{I} - \mu_{diag}[\mathbf{I} - (\mathbf{I} - \mu)_{diag}\bar{\mathbf{M}}^{\mathbf{S}}]^{-1} M^S X_{diag}] \tag{3.1}$$

Where $\mathbf{I}$ refers to the unity matrix while μ_{diag} is the diagonal matrix containing broker shares μ_i. The latter can be calculated as:

$\mu_{diag} = 1 - \frac{1}{TOT_i}$

With $TOT_i = \exp\left(\frac{1}{\sum_j \tau_{ij}} \sum \tau_{ij=1} \frac{\sum_k \tau_{kj}}{\sum_l \tau_{lj}}\right)$

where

$$\tau_{ij} = \left\{ \begin{array}{l} 1 \text{ if } m^s_{ij} > 0 \\ 0 \text{ else} \end{array} \right\} \tag{3.2}$$

Furthermore, $\bar{M}^S$ is the row stochastic adjacency matrix based on M^s, where $m^s_{ij} > 0$ refers to the share of power that flows from j to i. We denote political agents' interest in interest group support as X_{diag}

Let M^c denotes the $n \times n$ adjacency matrix of this communication network. The element $mc^c_{ij} = 1$ then indicates that actor i sends information to actor j. Moreover, let $\bar{M}^c$ denote the row stochastic transpose of M^c. Another building brick of the model is the extent that an actor's own knowledge determines his beliefs, which is labelled as own-control $\mathbf{\Omega}$.

Given these components, the network multiplier matrix corresponds to:

$$\hat{M}^c = [\mathbf{I} - (\mathbf{I} - \Omega)\bar{\mathbf{M}}^{\mathbf{c}}]^{-1} X\mathbf{\Omega} \tag{3.3}$$

where $\hat{m}_{ij}$ is the effect of j's initial on i's stationary final beliefs.

Like classical lobbying, informational lobbying takes place in social networks. Accordingly, this approach of communicational learning and the belief updating process (Acemoglu and Ozdaglar, 2010) is similar to that of Friedkin and Johnsen (1990, 1997).

3.4 Empirical Framework

3.4.1 Econometric Model

Our study employs a Bayesian approach to estimate Exponential Random Graph Models (ERGMs) for both the political support and the informational lobbying network (Wassermann and Faust, 1994; Henning *et al.*, 2019). Among others, ERGMs are suitable for network data because it accounts for the possibility of simultaneously testing several hypotheses about the network generating processes, while controlling for structural dependencies associated with network data (Robins *et al.*, 2007). Based on prior defined network statistics, ERGMs are also better suited to model network structures and explore the factors that drive the network generation process. They also allow for the modelling of actor specific endogenous variables, exogenous structural variables and other dyad-level network relationships that account for tie formations in policy networks (Leifeld and Schneider, 2012; Siciliano, 2015; Cranmer and Desmarais, 2011).

Given a $n \times n$ adjacency matrix $\mathbf{y}$ on a set of n actors, $y_{ij} = 1$ indicates that there is a directed tie from i to j, while $y_{ij} = 0$ indicates there is no tie between i and j since self-ties are not permitted. Furthermore, $s(y, X)$ describes a vector of network statistics containing endogenous as well as exogenous covariates. The latter are denoted by X and consist of attributes at the edge and node level. They enter the model either as $\sum_j(\sum_i y_{ij})X_j$, $\sum_j(\sum_i y_{ji})X_j$ for edge attributes or $\sum_i \sum_j y_{ij}X_{ij}$ for nodal attributes. Hence, following Robins *et al.* (2007) and Snijders (2011), an ERGM takes the following form, With a corresponding set of parameters for endogenous network statistics and exogenous variables denoted as $\theta = (\theta_1, \ldots, \theta_Q)$:

$$\Pr(y|X) = \frac{\exp\{\theta s(y, X)\}}{\sum_{\tilde{y}\in\mathcal{Y}} \exp\{\theta s(\tilde{y}, X)\}} \tag{3.4}$$

Furthermore, $\sum_{\tilde{y}\in\mathcal{Y}} \exp\{\theta s(\tilde{y}, X)\}$ serves as the normalizing constant that guarantees that equation 3.4 is a probability distribution.

However, parameter estimation in the ERGM framework is challenging. This is because the normalizing constant is intractable even for networks of moderate size, making parameter estimation in the ERGM framework very difficult. Another reason for this is that there is an enormous number of possible realizations in $\mathcal{Y}$. Thus, based on the literature (see Snijders, 2002; Hunter *et al.*, 2008; Hunter, 2007; Henning *et al.*, 2019; Hunter and Handcock, 2006), the Bayesian estimation approach using

Markov Chain Monte Carlo (MCMC) techniques was employed to solve this problem. The estimated parameters thus represent sample moments that are drawn from the posterior distribution. Based on these estimates, we can provide statistical inference on the derived measures for both lobbying mechanisms. For communication as well as political support we draw a sample of 10,000 networks. Thus, based on Goodreau *et al.* (2009) and Cranmer and Desmarais (2011), rewriting equation 3.4 as as conditional logit becomes:

$$\ln\left[\frac{\Pr(y_{ij}=1, Y_{ij}^{C}|X)}{\Pr(y_{ij}=0, Y_{ij}^{C}|X)}\right] = \theta\delta(y_{ij}, Y_{ij}^{C}, X). \tag{3.5}$$

Here, Y_{ij}^{C} represents all dyads other than y_{ij}. Moreover, we label the vector of changes in the sufficient statistics when y_{ij} changes from 0 to 1 with $\delta(y_{ij}, Y_{ij}^{C}, X)$ so that,

$$\begin{aligned}\Pr(y_{ij}=1|Y_{ij}^{C}, X) &= \frac{\Pr(y_{ij}=1, Y_{ij}^{C}|X)}{\Pr(y_{ij}=0, Y_{ij}^{C}|X)+\Pr(y_{ij}=1, Y_{ij}^{C}|X)} \\ &= \frac{\exp\{\theta\delta(y_{ij}, Y_{ij}^{C}, X)\}}{1+\exp\{\theta\delta(y_{ij}, Y_{ij}^{C}, X)\}}.\end{aligned} \tag{3.6}$$

As one of our principal interests is measuring the relative importance of our various endogenous and exogenous variables, we quantify the effects on the probability given in equation 3.6 that is derived from changes in $\delta(y_{ij}, Y_{ij}^{C}, X)$. Corresponding marginal effects are calculated using equation 3.7 below:

$$\frac{\partial\Pr(y_{ij}=1|Y_{ij}^{C}, X)}{\partial\delta(y_{ij}, Y_{ij}^{C}, X)} = \Pr(y_{ij}=1|Y_{ij}^{C}, X)(1-\Pr(y_{ij}=1|Y_{ij}^{C}, X))\theta. \tag{3.7}$$

Since the individual marginal effects are locally defined, they are a function of all endogenous and exogenous network statistics because they are also partial derivates at a specific point in time (Henning *et al.*, 2019).

3.4.2 Structural Effect and Organizational Specific Covariate Variables in ERGM Estimation

Structural Effect Variables

Structural effects describe the inherent network characteristics that are not dependent on personal organizational attributes to drive network tie formations. In our models, we measure structural effects using the following variables: edges, mutual, two-path, and transitivity. The *edges* measure the general likelihood of tie forma-

tion in the network. It is similar to the network density which measures the ratio of established communications and political support ties and all possible ties. It can be mathematically represented as:

$$E(y) = \sum_{i<j} y_{ij} \tag{3.8}$$

Our mutuality statistic (*mutual*), accounts for the likelihood that informational or political support sent from organisation i to organisational j is recipocated. Thus, $y_{ij} = y_{ji} = 1$.

$$H(y) = \sum_{i<j} y_{ij} y_{ji} \tag{3.9}$$

Our *two-path* statistic considers directed paths from actor i to j via k ($i > k > j$) and measures the likelihood that organizations who send informational or political support also receive same. Two further statistics are used to measure Transitivity. Following Hunter (2007), we use the geometrically weighted edgewise shared partner distribution, (*GWESP*), and the geometrically weighted dyad wise shared partner statistic, (*GWDSP*), to account for the amount for transitive triads in our policy network. GWESP is used as a preferred measure of triad transitivity because they help prevent model degeneration, a problem that is commonly associated with ERGM (Siciliano, 2015; Hunter *et al.*, 2008).

Organizational Specific Covariate Effect Variables

Organizational covariate effects measure the extent to which exchange ties in our network are driven by specific organizational attributes. To this end, we measure the propensity that exchange relationships within our networks are driven by *perceived influence or reputation* of an organization, *organizational expertise*, receptiveness to *external knowledge*, *policy and preference homophily* and belonging to the same organizational type *(Group Homophily)*. Additionally, by including *organizational specific attributes* at the node level, we account for the possibility that certain attributes of organisations influence tie formations. In the communications network, we generally expect political agents (the executive branch of government, parliamentarians, local governments), donors and members of the media to be demanders of information. Additionally, we expect certain organizations to be senders of information. For instance, in order to influence final policy choice, some interest groups are likely to share information about their policy beliefs with political actors and other stakeholder organizations. Donors and research organizations, renowned for

their policy expertise, are also likely to be trusted senders of information. Moreover, governmental organizations also share information with other local stakeholders and donor organizations to develop strong local buy-in and donor support. For our political support model, in addition to farmer interest groups, we also assume that the executive branch of government, civil society organizations, donors, research organizations and the media are likely to send support to other stakeholders to secure political support for their policy priorities.

At the node level, we measure the propensity of tie creation when organizations belong to the same organizational type and use the variable *external knowledge* to control for the propensity that tie formations in a communications network are influenced by an organization's openness to external knowledge. Following Leifeld and Schneider (2012), we also assume that previous or existing exchange relationship could also increase the likelihood of additional exchange relationships. Thus, at the edge level, we include the existence of informal social relations ties and political support ties as independent variables in our communications model and social relations ties and communications ties as independent variables in our political support model.

Finally, at the edge level, we consider four broad policy interest issues and seven specific land reform policy positions, listed in table 3.1, to account for the possibility that informational exchange or political support are influenced by shared policy interests or similar policy positions. For all policy issues, we calculate the Euclidean distance between the organizations concerning the level of their importance and add these statistics at the edge level. These organizational specific covariate effect variables are summarized in table 3.1.

Our data analysis was undertaken using the statistical software *R*. Specifically, for estimation analysis, we relied on *Bergm*, *ergm* and *tidyverse*, statistical packages developed by Caimo and Friel (2014), Hunter and Handcock (2006) and Wickham *et al.* (2019) respectively. For post-estimation analysis, we used Arnold (2017)'s *ggthemes*.

Table 3.1: Organizational Specific Covariate Effect Variables for ERGM estimation

Level	Attributes	Definition
Node	**Group**	Organizational group 1 Executive 3 Legislative 4 Local Government 5 Civil Society Organisation 6 Donors 8 Research 9 Farmer organisations 11 Media
Edge	comm.nw	Communications network tie
	pol.nw	Political support Network tie
	soc.nw	Informal social relations network tie
	Reputation	Perceive Influence of an organisation
	ExternalKnowledge	Organisation's receptive to external information
	interest.influence	Organisation's ability to influence voters
	Policy incentives	
	Z_GROWTH	Euclidean distance: Importance of economic growth
	Z_POVERTY	Euclidean distance: Importance of Poverty reduction
	Z_FSECURITY	Euclidean distance: Importance of Food Security
	Z_ENVIRONMENT	Euclidean distance: Importance of Environmental protection
	Policy Beliefs	
	A_ADMINFRAMEWORK	Euclidean distance: Importance of the establishment of a new land administrative framework
	A_GOVREFORM	Euclidean distance: Importance of customary land governance reform
	A_TITLEREGIS	Euclidean distance: Importance of the establishment of a comprehensive land title registration system
	A_SURVEY	Euclidean distance: Importance of land demarcation, mapping and survey services
	A_GENDER	Euclidean distance: Importance of land property rights of women
	A_RESTRICTION	Euclidean distance: Importance of land property rights of foreigners
	A_TAXATION	Euclidean distance: Importance of taxation of land leasehold fees
	A_LARGESCALE	Euclidean distance: Importance of land property rights of large scale land investors
	A_SMALLHOLDER	Euclidean distance: Importance of land property rights of small holder farmers

3.5 Data Sources

3.5.1 Empirical Setting: Policy Networks in Sierra Leone

Our empirical findings are based on an elite network survey conducted in Sierra Leone between October and November of 2018. Our units of observation were organizations that were considered as corporative actors because of their formal policy formulation responsibilities (Coleman, 1990). Accordingly, in the course of administering our questionnaires, we emphasized to respondents that we were particularly interested in the views and positions of their organizations and not their personal opinions. We selected participants in our survey following a two-step approach commonly used in network studies (Pappi and Henning, 1999a; Henning, 2009). First, through desk research and expert interviews, we identified organizations with formal political power and organizations that have access to formal powerful actors in Sierra Leone's agricultural and land policy domain due to their institutional position. This resulted in a preliminary list of 107 organizations.

In the second step, based on our preliminary list, personal interviews were conducted beginning with governmental organizations and the most important interest groups (i.e., farmer organizations, civil society organisations, donor etc). Using a reputation question in our interviews, respondents were requested to mark all organizations they perceived as influential on our preliminary list. In instances where their preferred organizations were not part of the list, respondents were encouraged to add new organizations to our preliminary list. The question was framed in such a way that respondents did not have to put great effort in identifying and marking organizations that they deemed influential in the policy domain. This framing assumes that highly important organizations will come quickly to mind. It also increases the quality of the reputation network as less influential organizations are less likely to be marked. Organizations that received three or more nominations were subsequently interviewed. This approach was used to further identify important actors using a snow-ball sampling method. The reputation network was additionally used to model the perceived influence of actor j by actor i. A total of 39 stakeholder organizations were interviewed. The organisations were divided into groupings based on organizational type. An overview of the list of interviewed organization, together with their indegree of centrality, a proxy for the perceived influence of an organization, is presented in table 3.2

Table 3.2: Interviewed Organizations

Acronym	Orgname	Orgtype	IDC
OPRES	Office of the President	EXEC	0.87
MAF	Ministry of Agriculture and Forestry	EXEC	0.97
MOF	Ministry of Finance	EXEC	0.84
MLHE	Minister of Lands, Housing and Environment	EXEC	0.95
MLGRD	Minister of Local Government and Rural Development	EXEC	0.68
MOPED	Ministry of Planning and Economic Development	EXEC	0.66
MTI	Ministry of Trade and Industry	EXEC	0.71
BSL	Bank of Sierra Leone	PUBAG	0.66
EPA	Environmental Protection Agency of Sierra Leone	PUBAG	0.66
NRA	National Revenue Authority	PUBAG	0.66
SLIEPA	Sierra Leone Investment and Export Promotion Agency	PUBAG	0.79
Stats SL	Statistics Sierra Leone	PUBAG	0.68
APC	All Peoples Congress	LEG	0.39
SLPP	Sierra Leone Peoples Party	LEG	0.45
PCAF	Paliamentary Committee on Agriculture and Forestry	LEG	0.55
DC	District councils	LGVT	0.79
PC	Paramount Chiefs	LGVT	0.89
ALLAT	Action for Large-scale Land Acquisition Transparency	CSO	0.32
GS	Green Scenery	CSO	0.55
ADB	African Development Bank	DONOR	0.68
DFID	Department for International Development of the British Government	DONOR	0.55
EU	European Union	DONOR	0.84
FAO	Food and Agricultural Organisation of the United Nations	DONOR	0.79
IMF	International Monetary Fund	DONOR	0.76
UNDP	United Nations Development Programme	DONOR	0.89
WB	World Bank	DONOR	0.82
WFP	World Food Program	DONOR	0.68
Action Aid	Action Aid	iNGO	0.26
NAMATI	NAMATI	iNGO	0.37
WHH	Welt Hunger Hilfe	iNGO	0.68
SLARI	Sierra Leone Institute of Agricultural Research	RESEARCH	0.47
NU	Njala University	RESEARCH	0.42
DWFC	District Women's Farmers Cooperatives	IG:PROD	0.45
NFFSL	National Federation of Farmers of Sierra Leone	IG:PROD	0.82
SLPMC	Sierra Leone Produce Marketing Company	IG:AGIND	0.55
SLCAB	Sierra Leone Chamber of Agri-Business	IG:AGIND	0.42
SLCCIA	Sierra Leone Chamber of Commerce, Industry & Agriculture	IG:AGIND	0.53
AYV	African Young Voices Radio/Television	MEDIA	0.24
RADIO D	Society for Radio Democracy 98.1 FM	MEDIA	0.39

Source: Calculated by authors from own data.

3.5.2 Network Data

Based on our standardized questionnaire, we also collected data about the two main variables of interest in our study; communications and political support exchange networks, together with network data about reputation and social relations. Following Leifeld and Schneider (2012), we assess communications and political support exchanges through expert knowledge exchange and bargaining for political support among stakeholder organizations. To collect data on the exchange of expert information, interviewees were asked to mark those organizations, on the preliminary list of organizations, with whom they share information about the consequences of agricultural and land reform policies. In particular, expert information data were collected from both the suppliers' perspective, e.g. interest groups, and from the demanders' perspective, e.g. governmental institutions. This enabled us to construct a confirmed and complete expert knowledge network, a network type that is considered more reliable from a network theoretical perspective (Pappi *et al.*, 1995; Henning *et al.*, 2019). A knowledge transfer is considered as 'confirmed' if both the supplier and demander of information independently report this transfer. We also followed previous studies (Pappi and Henning, 1999b; Stark, 2016) and employed an established approach from the social network literature to measure informational exchanges from both a *sender* and a *receiver* perspective. Accordingly, we used this data to compile a confirmed network with the corresponding matrix $\mathbf{M}$. Hence,

$$m_{ij} = \left\{ \begin{array}{l} 1 \text{ if tie from } i \text{ to } j \\ 0 \text{ if no tie from } i \text{ to } j \end{array} \right\} \tag{3.10}$$

Self-ties are not allowed. Therefore, the diagonal of $\mathbf{M}$ is set to zero.

To collect data about our political support network, organisations were requested to select, from our preliminary list, organizations they deemed important during the formulation of policies supported by a majority of voters, while representatives of non-governmental organizations were asked to select the political institutions that intermediate their client's interests. We also collected data about social ties by asking respondents to mark, from our preliminary list, organizations with whom they had established social relations that extend beyond professional contacts and facilitates cooperation between their respective organizations. This social relations network data later served as a structural variable in our ERGM. The corresponding questions from the survey interview are shown in appendix B.1.

Network boundaries were specified using a reputation network. Specifically, actors

marked the organizations whom they perceive as an influential actor in the agricultural and land policy domain. Given that the corresponding socio matrix G, g_{ij} corresponds to the answer of i that actor j is an influential organization. An indegree of centrality, shown in equation 3.11, is calculated and used as reputation measurement:

$$d_j = \sum_j g_{ij} \ \forall i \neq j \tag{3.11}$$

An actor j is not part of the network if $d_j = 0$.

3.5.3 Policy Interest and Policy Beliefs data

In part 1 of our questionnaire, we asked respondents to distribute 100 points across a selection of four generic policy goals to evaluate the interest stakeholder organisations have in general economic and agricultural policies in Sierra Leone. Also, in section 4 of the same questionnaire, we collected data about the preferred position of stakeholder organizations in relation to Sierra Leone's land policy reform program. We used a 7-point ordinal scale of positions to model stakeholder organizations policy positions concerning specific sets of land reform policy strategies (see table 3.3 for a description of the policy interest and land reform policy beliefs variables). Our ordinal scale had fixed and meaningful poles which served as an empirical metric to measure the distances between actors in the policy space. Our rating scale ranged from 1 to 7, with 1 implying a policy position that supports reforms and 7 implying a policy positions that supports maintaining the current status quo. These two sets of variables are presented in table 3.3. They were used to calculate a distance index approximating policy preference homophily. Such an index provides dyad-specific information on the probability of observing an exchange relationship between elite members due to similarity in policy interests and policy beliefs. The distances of our broad categories were used to measure preference similarity, representing policy interest in generic policy issues and beliefs about specific land reform policy positions. The variables used in measuring the policy positions are presented in table 3.3.

Table 3.3: Description of Policy Variables

Type of data	**Variables**
Policy Interests	
Growth of the Gross Domestic Product (GDP)	Z_GROWTH
Poverty reduction	Z_POVERTY
Food Security	Z_FSECURITY
Environmental sustainability	Z_ENVIRONMENT
Policy Positions	
Establishment of a new land administrative framework	A_ADMINFRAMEWORK
Customary land governance reform	A_GOVREFORM
Establishment of a comprehensive land title registration system	A_TITLEREGIS
Land demarcation, mapping and survey services	A_SURVEY
Land property rights of women	A_GENDER
Land property rights of foreigners	A_RESTRICTION
Taxation of land leasehold fees	A_TAXATION
Land property rights of large scale land investors	A_LARGESCALE
Land property rights of small holder farmers	A_SMALLHOLDER

3.6 Results

3.6.1 Realised Network

To determine the level of influence various stakeholder organizations have in the policy formulation process, we calculated the influence and political support structures within our policy networks. In the former, we excluded own control figures and normalized the values to only account for the effect of external knowledge in the belief formation process. The results from our aggregated communication multiplier, shown in figure 3.2, illustrate that the executive branch of government and donor organizations are the most influential groups in the communications network. For instance, the external source of knowledge of the donor community (54%), public agencies (40%), and the media organizations (40%) are determined by the executive branch of government. Donors as well drive the external knowledge of executive (34%), public agencies (32%), researchers (31%), and agricultural producers (30%). Additionally, the results from our political support multipliers, also shown in figure 3.2 indicates that a majority of the power outflow of all the actors are assigned to donors and the executive branch of government. The transfer of political support to donors cannot be unrelated to the fact that many stakeholder organizations like government agencies, civil society organizations and other non-governmental organizations rely largely on external funds from donors for their functioning. Also, the transfer of political support to the executive could be attributed to the fact that political power to formulate policies largely resides with the executive branch of government.

3.6.2 ERGM Results

The Bayesian estimated results from our ERGM specifications are shown in table 3.4 and table 3.5. For each of the policy networks, 7 models were estimated. The first model estimates only endogenous variables, while models 2-4 estimates only structural exogenous variables, with models 3 and 4 estimating only ”preference specific” variables. The remaining models, 5-7, combine both endogenous and exogenous variables.

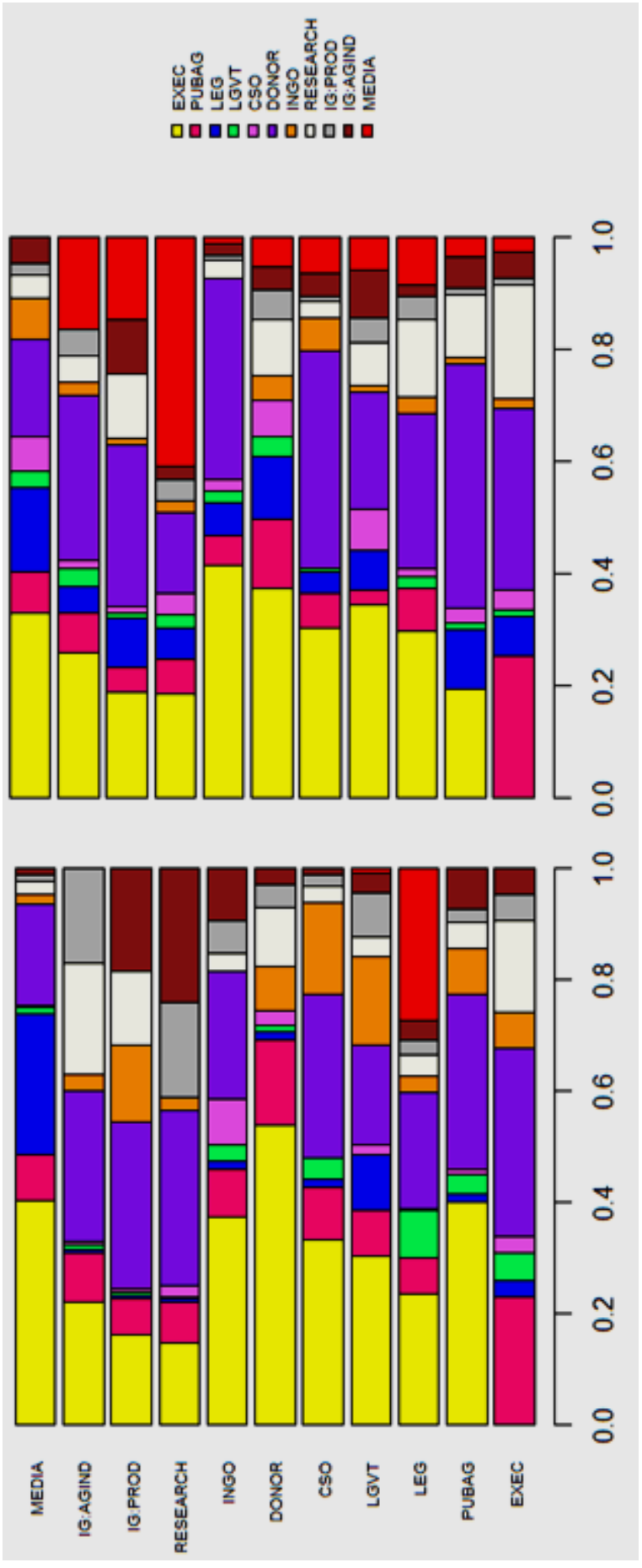


Figure 3.2: Communications and Political Support Multiplier.

Source: own presentation of data.

Table 3.4: Results of Bayesian Estimation of ERGM Specification of Communications Model

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
edges	-2.751 ***				-3.617 ***	-3.283 ***	-3.057 ***
	(0.621)				(0.282)	(0.339)	(0.33)
mutual	1.71 ***				1.511 ***	1.598 ***	1.446 ***
	(0.392)				(0.272)	(0.201)	(0.265)
twopath	0.04 **				0.026	0.015	0.023
	(0.017)				(0.016)	(0.015)	(0.016)
gwesp	0.463				-0.269	-0.251	-0.248
	(0.33)				(0.186)	(0.198)	(0.242)
gwdsp	-0.114 **				-0.184 ***	-0.206 ***	-0.19 ***
	(0.062)				(0.046)	(0.045)	(0.048)
factor (out): EXEC		0.432 **			0.113	-0.033	-0.239
		(0.219)			(0.218)	(0.293)	(0.247)
factor (out): CSO		-1.198 ***			-0.561 **	-0.791 ***	-0.49
		(0.395)			(0.303)	(0.357)	(0.296)
factor (out): DONOR		-0.074			-0.594 ***	-0.566 **	-0.568 **
		(0.189)			(0.228)	(0.269)	(0.257)
factor (out): RESEARCH		-0.46			-0.057	0.216	-0.012
		(0.321)			(0.293)	(0.276)	(0.235)
factor (out): MEDIA		-1.781 ***			0.542	0.67 *	0.497
		(0.498)			(0.355)	(0.334)	(0.32)
factor (in): EXEC		0.429 **			-0.159	-0.302	-0.195
		(0.199)			(0.286)	(0.255)	(0.25)
factor (in): LEG		-1.074 ***			-0.115	-0.381 *	-0.315
		(0.274)			(0.309)	(0.258)	(0.336)
factor (in): LGVT		1.632 ***			0.627 *	-0.11	0.402
		(0.286)			(0.317)	(0.227)	(0.338)
factor (in): DONOR		-0.001			-0.606 **	-0.855 ***	-0.725 ***
		(0.207)			(0.245)	(0.216)	(0.225)
factor (in): MEDIA		-0.77 ***			0.442	0.514	0.308
		(0.32)			(0.316)	(0.277)	(0.296)
homophily: GROUP		0.691 ***			0.843 ***	1.01 ***	0.858 ***
		(0.225)			(0.251)	(0.197)	(0.297)
edgecov: soc.nw		1.394 ***			0.77 ***	0.509 **	0.597 ***
		(0.155)			(0.214)	(0.16)	(0.256)
edgecov: pol.nw		0.792 ***			0.68 ***	0.742 ***	0.773 **
		(0.148)			(0.157)	(0.156)	(0.235)
node (out) Reputation		-0.007			0.049 ***	0.052 ***	0.05 ***
		(0.01)			(0.016)	(0.015)	(0.017)
node (in) Reputation		-0.027 *			0.035 **	0.043 **	0.035 **
		(0.011)			(0.016)	(0.016)	(0.018)
node (in) external knowledge		-2.234 ***			-1.01 ***	-1.125 ***	-1.102 ***
		(0.398)			(0.287)	(0.266)	(0.379)
edgecov: A_ADMINFRAMEWORK			0.21		-1.4 ***		
			(0.602)		(0.363)		
edgecov: A_GOVREFORM			0.946		-0.406		
			(0.661)		(0.396)		
edgecov: A_TITLEREGIS			-1.754 **		-0.257		
			(0.766)		(0.481)		
edgecov: A_SURVEY			-0.644		-0.848 *		
			(0.871)		(0.468)		
edgecov: A_GENDER			-1.161 *		-0.429		
			(0.61)		(0.435)		
edgecov: A_RESTRICTION			0.086		1.236 **		
			(0.585)		(0.394)		
edgecov: A_TAXATION			-3.13 ***		0.384		
			(0.919)		(0.353)		
edgecov: A_LARGESCALE			0.628		3.596 ***		
			(0.775)		(0.447)		
edgecov: A_SMALLHOLDER			0.041		0.56		
			(0.818)		(0.408)		
edgecov: Z_GROWTH				0.716 ***		1.188 ***	
				(0.263)		(0.23)	
edgecov: Z_POVERTY				0.48		0.466 **	
				(0.295)		(0.263)	
edgecov: Z_FSECURITY				0.068		0.301	
				(0.266)		(0.371)	
edgecov: Z_ENVIRONMENT				-3.163 ***		-1.538 ***	
				(0.259)		(0.306)	

Source: Calculated by authors from survey data.

Table 3.5: Results of Bayesian Estimation of ERGM Specification of Political Support Model

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
edges	-1.466 ***				-1.965 ***	-1.49 ***	-1.222 ***
	(0.483)				(0.416)	(0.264)	(0.374)
mutual	0.688 **				0.602 **	0.666 ***	0.676 ***
	(0.31)				(0.257)	(0.209)	(0.314)
twopath	0.015				0.016	0.014	0.014
	(0.013)				(0.013)	(0.015)	(0.013)
gwesp	0.277				-0.313 *	-0.306	-0.21
	(0.26)				(0.171)	(0.233)	(0.246)
gwdsp	-0.212 ***				-0.199 ***	-0.198 ***	-0.192 **
	(0.044)				(0.042)	(0.057)	(0.054)
factor (out): EXEC		0.634 ***			0.377	0.427 *	0.519 ***
		(0.209)			(0.23)	(0.224)	(0.206)
factor (out): CSO		0.037			-0.108	-0.031	-0.093
		(0.264)			(0.31)	(0.283)	(0.232)
factor (out): DONOR		0.869 ***			0.368 *	0.51 **	0.551 *
		(0.203)			(0.197)	(0.189)	(0.292)
factor (out): IG_PROD		-0.328			-0.38	-0.197	-0.277
		(0.265)			(0.253)	(0.309)	(0.247)
factor (out): MEDIA		-0.614 ***			-0.913 ***	-0.731 ***	-0.58
		(0.259)			(0.249)	(0.243)	(0.283)
factor (in): EXEC		-0.725 ***			-0.281	-0.132	-0.185
		(0.247)			(0.219)	(0.235)	(0.228)
factor (in): LEG		-1.046 ***			-0.036	-0.03	-0.107
		(0.332)			(0.232)	(0.228)	(0.239)
factor (in): LGVT		-0.746 ***			-0.444	-0.402	-0.386
		(0.232)			(0.238)	(0.244)	(0.275)
homily: Group		0.092			0.259	0.269	0.219
		(0.231)			(0.245)	(0.206)	(0.335)
edgecov: soc.nw		0.646 ***			0.374 *	0.307	0.672 ***
		(0.153)			(0.175)	(0.167)	(0.221)
edgecov: comm.nw		0.826 ***			0.694 ***	0.59 ***	0.261
		(0.105)			(0.173)	(0.165)	(0.219)
node (out): Reputation)		-0.043 ***			-0.023 *	-0.021 *	-0.022 *
		(0.011)			(0.015)	(0.013)	(0.015)
node (in): Reputation)		0.016 *			0.027 *	0.029 ***	0.023 *
		(0.007)			(0.015)	(0.011)	(0.013)
node (in): Interest Influence)		0.073 ***			-0.008	-0.018	0
		(0.025)			(0.026)	(0.029)	(0.033)
edgecov: A_ADMINFRAMEWORK			0.719		2.089 ***		
			(0.603)		(0.249)		
edgecov: A_GOVREFORM			0.911		0.387 *		
			(0.644)		(0.282)		
edgecov: A_TITLEREGIS			1.134		1.044 **		
			(0.764)		(0.384)		
edgecov: A_SURVEY			-0.123		-0.197		
			(0.814)		(0.297)		
edgecov: A_GENDER			-3.147 ***		-1.044 ***		
			(0.575)		(0.282)		
edgecov: A_RESTRICTION			-0.216		-0.379		
			(0.559)		(0.28)		
edgecov: A_TAXATION			-2.108 **		-0.413		
			(0.906)		(0.304)		
edgecov: A_LARGESCALE			-0.277		1.345 ***		
			(0.76)		(0.251)		
edgecov: A_SMALLHOLDER			-0.225		-0.085		
			(0.782)		(0.419)		
edgecov: Z_GROWTH				0.66 ***		0.707 ***	
				(0.245)		(0.234)	
edgecov: Z_POVERTY				-0.388		-0.507 *	
				(0.264)		(0.322)	
edgecov: Z_FSECURITY				-0.406		-0.012	
				(0.251)		(0.235)	
edgecov: Z_ENVIRONMENT				-1.446 ***		0.073	
				(0.239)		(0.3)	

Source: Calculated by authors from survey data.

Table 3.6: Average Marginal effects based on Models 6

	Communications Network	**Political support Network**
edges	-0.50769 ***	0.0343 **
	(0.07555)	(6.79406)
mutual	1 ***	1 ***
	(0)	(0)
twopath	0,00013	-0.00079
	(0,00013)	(0.00859)
gwesp	-0.03663	
	(0.02925)	
gwdsp	-0.00913 ***	
	(0.0026)	
Factor (out): EXEC	-0.03022	1.15699 *
	(0.26008)	(1.2681)
Factor (out): CSO	-2.42225 ***	-5.09595
	(1.17854)	(32.90884)
Factor (out): DONOR	-0.42897 **	0.24345 *
	(0.22001)	(7.41511)
Factor (out): RESEARCH	0.62434	
	(0.62434)	
Factor (out): IG:PROD		-3.59762
		(12.98415)
Factor (out): MEDIA	2.00871 *	0.91401 **
	(0.95756)	(59.41714)
Factor (in): EXEC	-0.25963	0.94591
	(0.22021)	(8.55103)
Factor (in): LEG	-0.76203 *	3.24713
	(0.5408)	(24.8006)
Factor (in): LGVT	-0.34178	2.4261 **
	(0.69727)	(51.79192)
Factor (in): DONOR	-0.64632 ***	
	(0.19258)	
Factor (in): MEDIA	1.57697	
	(0.99078)	
Homophily: GROUP	1.59045 ***	-0.85423
	(0.38877)	(16.32127)
edgecov: soc.nw	0.48356 ***	-0.13517
	(0.016803)	(2.01814)
edgecov: pol.nw	0.40035 ***	
	(0.10545)	
edgecov: comm.nw		-1.0473 **
		(16.92928)
node (out) Reputation	0.00034 ***	2e-04
	(1e-04)	(0.00328)
node (in) Reputation	0.00028 *	0.00035 *
	(0,00011)	(0.0025)
node (in) external knowledge	-0.42296 ***	
	(0.10331)	
edgecov: Z_GROWTH	-0.05561 *	-0.29813 **
	(0.03328)	(7.46324)
edgecov: Z_POVERTY	-0.03123	0.2875 **
	(0.04185)	(6.69859)
edgecov: Z_FSECURITY	0.03404	-0,06412
	(0.04086)	(0.30136)
edgecov: Z_ENVIRONMENT	0.31045 ***	0.03352
	(0.21568)	(0.79032)

Hypotheses 1 through 4 examine the extent to which perceived organizational influence, organisational expertise, preference or policy homophily, and the extent to which previous network ties influence exchange relationships in both our communications and political support networks. In our communications network, contrary to apriori expectations, a negative and significant coefficient for our *Reputation(out)* covariate suggest that perceived reputation reduces the exchange of expert communications. In our political support network, however, while the negative and significant coefficient of our *Reputation(out)* coefficient indicates that reputation of an influence provider negatively affects political support, a positive and significant coefficient suggests that the perceived influence of a support provider positively influences political support receivers.

In regards to specific *nodal attribute effects*, our results suggest that the odds of the establishment of an exchange relationship in the communications network increases if the information sender is *executive branch of government* as shown in model 2. This is also the indication in models 5 and 6, as shown by the positive but insignificant coefficients. Media organisations, as senders of information, also increase communications ties as the positive and significant coefficient in model 6 indicates. Expert informational exchange also increases if the receiver is part of both the central and local government. In our political support network, however, the establishment of an exchange relationship only increases if the information sender is part of the *executive* or a *donor* organisation. Therefore, our results confirm hypotheses 1(a) and 1(b). Also, since we found no significant sender effects for both research and donor organizations in our communications model, hypotheses 2(a) and 2(b) are therefore rejected.

Across both networks, multiplexity seemingly influences the establishment of exchange relationships. The positive and significant coefficient of the *edgecov:soc.nw* and *edgecov:pol.nw* variables in our communications network and the *edgecov:soc.nw* and *edgecov:nw* variables in our political support network, are an indication that the existence of informal social relationships and previous or existing exchange relations increases the propensity for the establishment of additional exchange ties. Thus, the results confirm that reciprocity and multiplexity are two of the main ways through which organisations identify reliable exchange partners while simultaneously reducing the cost of obtaining cogent and trustworthy information. Therefore, hypothesis 4, which predict that organisations that have informal social relations and other existing ties have a higher propensity of establishing further informational exchange and political support relationships, is confirmed.

In relation to *preference homophily*, models 3 and 4 show results that do not control for endogenous structural effects and other covariate effects, while Models 5 and 6 show results that account for endogenous structural effects and other covariate effects. These results, as shown in tables 3.4 and 3.5, indicate that when organisations share similar land reform policy position on issues relating to the *restriction of land ownership of foreigners, land right of large-scale farmers*, there is a significant and positive impact on the odds of tie creation. In the political support network, the similarity of preference on issues relating to *establishment of a new land administrative framework, customary governance reform, strengthening the property rights of large-scale farmers* tend to increase tie formation. For the general policy preferences, the similarity in preference for *growth of the country's economy* tend to increase tie formation in both the communications and political support networks. This is in addition to *poverty reduction* which increases tie formation in the communications networks. These results partially confirm hypothesis 3 and demonstrates that, while there is observed preference homophily on some policy positions, others do not drive tie formation.

In relation to the structural effects of network determinations, our results show that in both networks, the *mutual* variable is the only endogenous structural variable that is both positive and significant. This indicates that the likelihood of informational and political support exchanges between organizations increases if *organization i and j* already have an established relationship. Additionally, our *two-path* variable is positive in all our models but only significant when we do not control for organizational specific attributes (model 1) in our communications network. This result suggests that organizations who send expert information to others are likely to also receive similar information from those organization. However, while these results confirm hypothesis 5 for the communications models, it is rejected in our political support model.

Finally, the *gwdsp* variable is significant and negative across all models in both networks, while the *gwesp* variable is negative but significant in models 5, 6 and 7 of our communications network. It is also negative and significant in model 5 of the political support model. These results are in line with other findings which conclude that stakeholder organizations rely on each other to reduce transaction costs in establishing exchange relationships as they search for reliable and trustworthy exchange partners (Leifeld and Schneider, 2012).

A measure of the importance of the various attributes in our model is estimated using average marginal effects. As can be seen from the results in table 3.6, the

network statistic *mutual*, a measurement of reciprocity, is one of the most important attributes that drive informational exchange in both networks. It average marginal effect equals 1, indicating that the probability of i sending information j increases by 100 percentage point if the network statistic *mutual* increases by one unit. This underscores its position as the main driver of informational exchange in both network. Other important attributes that drive informational exchange in the communications network include; Group Homophily, the reputation of both senders and receivers, and consensus on issues related to environmental protection. Furthermore, political support is driven by: the executives, local governmental authorities, the reputation of receivers, and consensus on issues related to poverty reduction.

3.6.3 Model Fit

We determine the model that best fits our data based on the lowest AIC and BIC values. Using these indicators, as presented in table 3.7, model 6, for both communications and political support networks, are the models that best fit our data as they both have the lowest AIC and BIC. Additionally, based on Caimo and Friel (2014), the Bayesian goodness of fit indicators, shown in figure 3.3, also indicate that models 6, for both our communications and political support networks, best fits our data.

Table 3.7: Model fit criteria

	Log. Likelihood		**AIC**		**BIC**	
	Com.nw	*Pol.nw*	*Com.nw*	*Pol.nw*	*Com.nw*	*Pol.nw*
Model 1	-748.97	-836.63	1507.94	1683.26	1534.44	1709.77
Model 2	-721.88	-830.97	1475.76	1689.94	1560.57	1764.15
Model 3	-818.23	-869.28	1654.46	1756.56	1702.17	1804.27
Model 4	-775.42	-884.52	1558.84	1777.04	1580.04	1798.24
Model 5	-615.17	-776.14	1290.34	1608.28	1449.37	1756.71
Model 6	-596.63	-775.37	1243.27	1596.75	1375.8	1718.67
Model 7	-622.02	-783.41	1286.04	1604.81	1397.36	1705.54

Source: Calculated by authors from survey data.

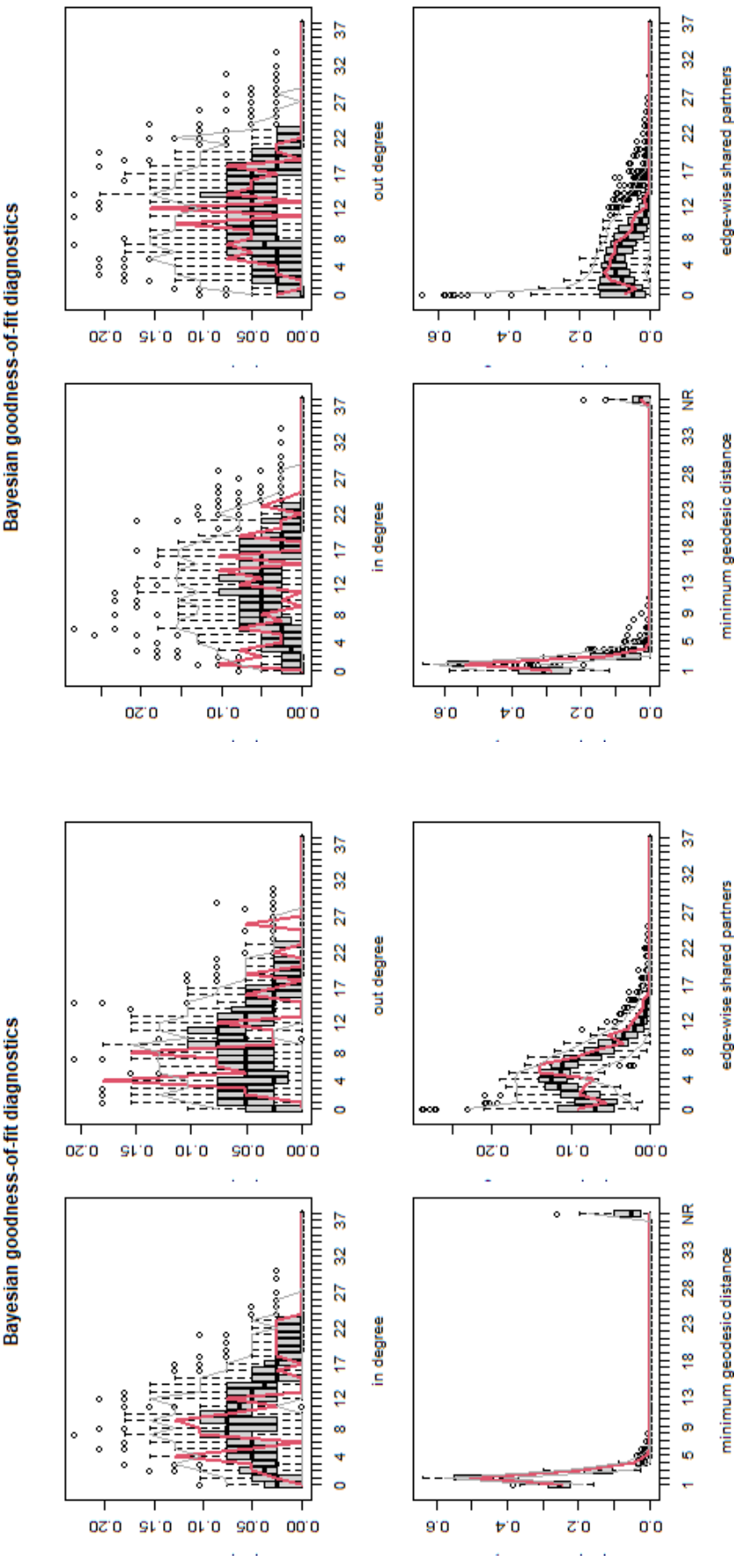


Figure 3.3: Goodness of Fit for Models 6 of the Communications (left) and Political Support (right) Networks

Source: own presentation of survey data.

3.6.4 Assessing Changes in Policy Beliefs for Land Reform Policy Instruments

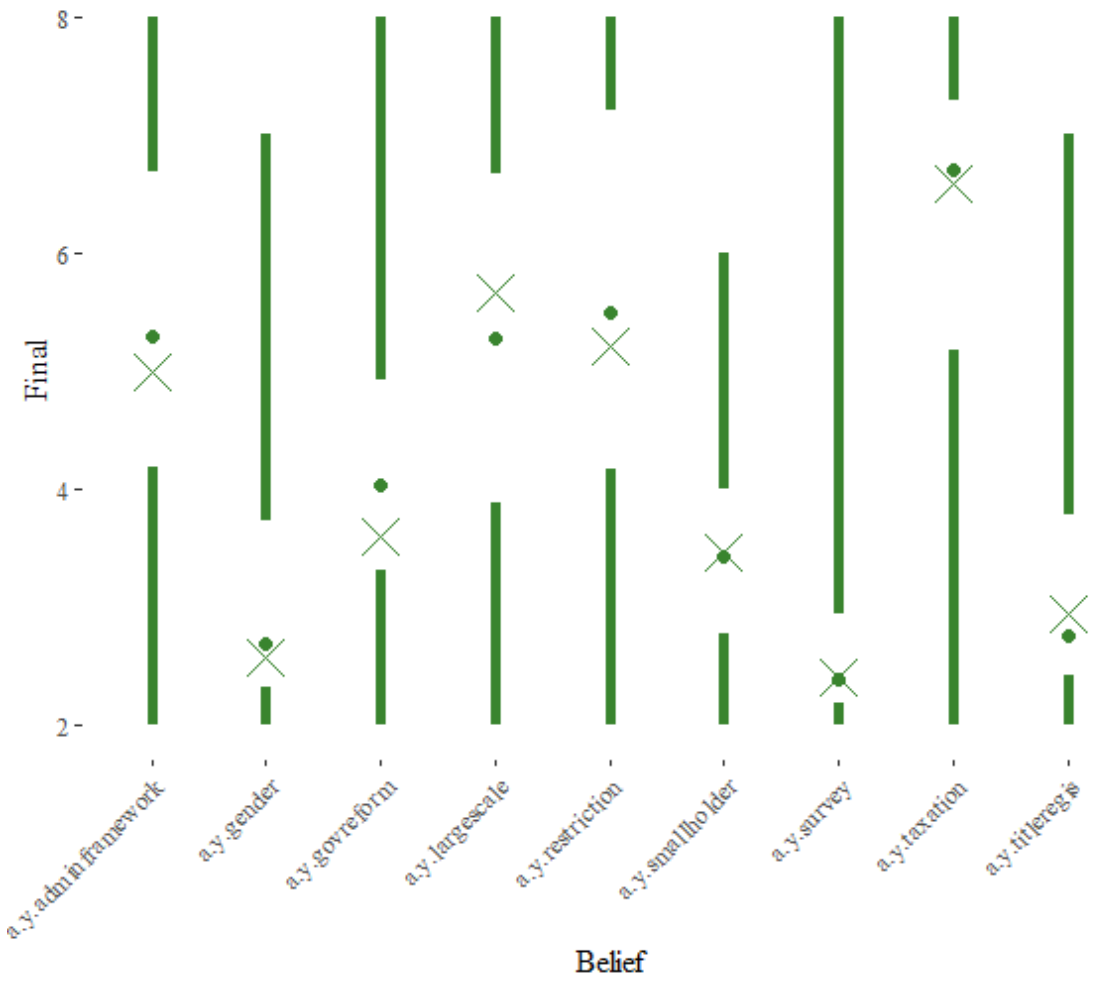
We used the estimated results of our best model specification to simulate 10,000 networks and then applied the derived parameters to those from our realised communications network configurations to test for robustness. We start by comparing the average beliefs in our realised network with that of our simulated beliefs. In this case, the calculated sample means represent the estimated empirical belief change of our land reform policy instruments derived from the realised communications networks. This is presented in figure 3.4. The points and crosses represent the sample median of simulated final beliefs and the average final beliefs respectively.

The results indicate that, in all but two instances, the median final belief of our realised network is either lower than or exactly equal to the simulated beliefs. In regards to the strengthening of land rights of small-holder farmers and land demarcation and surveying services, the simulated beliefs exactly match the average beliefs of our realised network. It is only in the case of land rights of large-scale farmers and the introduction of land titling and registration system that we observe situations in which our realised beliefs are higher than our simulated beliefs.

We also test the significance of our realised communications networks by comparing the means of our simulated beliefs with that of the means of our final beliefs in the realised network at a 95 percent confidence interval at the group level. These results, as shown in figure 3.5, show that the realised group means of almost all land reform policies fall within the confidence intervals indicating that they are significant at a 95% confidence interval. The only exception is the mean of Agricultural Producers interest groups in relation to land administrative policy reform. These results underscore the robustness of our simulations.

Lastly, to examine the extent to which the different groups are sensitive to informational exchange, we measure the magnitude of the changes that result from communications (delta group means) by calculating 10,000 delta group means for our simulated networks. The distribution of the simulated changes is depicted in figure 3.6. They indicate that group deltas for both our realised and simulated networks are very similar for policy reforms related to land demarcation and survey instruments, taxation of leasehold fees, the establishment of land titling, and land property rights of small-holder farmers for all groups, with the exception of members of the legislative group.

Figure 3.4: Final Beliefs Values Based on Simulated and Realised Networks.



This indicates that these policy reforms issues are not so sensitive to informational exchanges, confirming our results in section 2.5.3. Additionally, the wider variations between the deltas of the realised and simulated networks for the legislative group underscores their sensitivity to information exchange on all policy issues. The same can be said of NGOs and agricultural sector interest groups on most of the land reform policy issues. Thus, overall, we can infer from this comparison that the influence measures of our communications network are very robust.

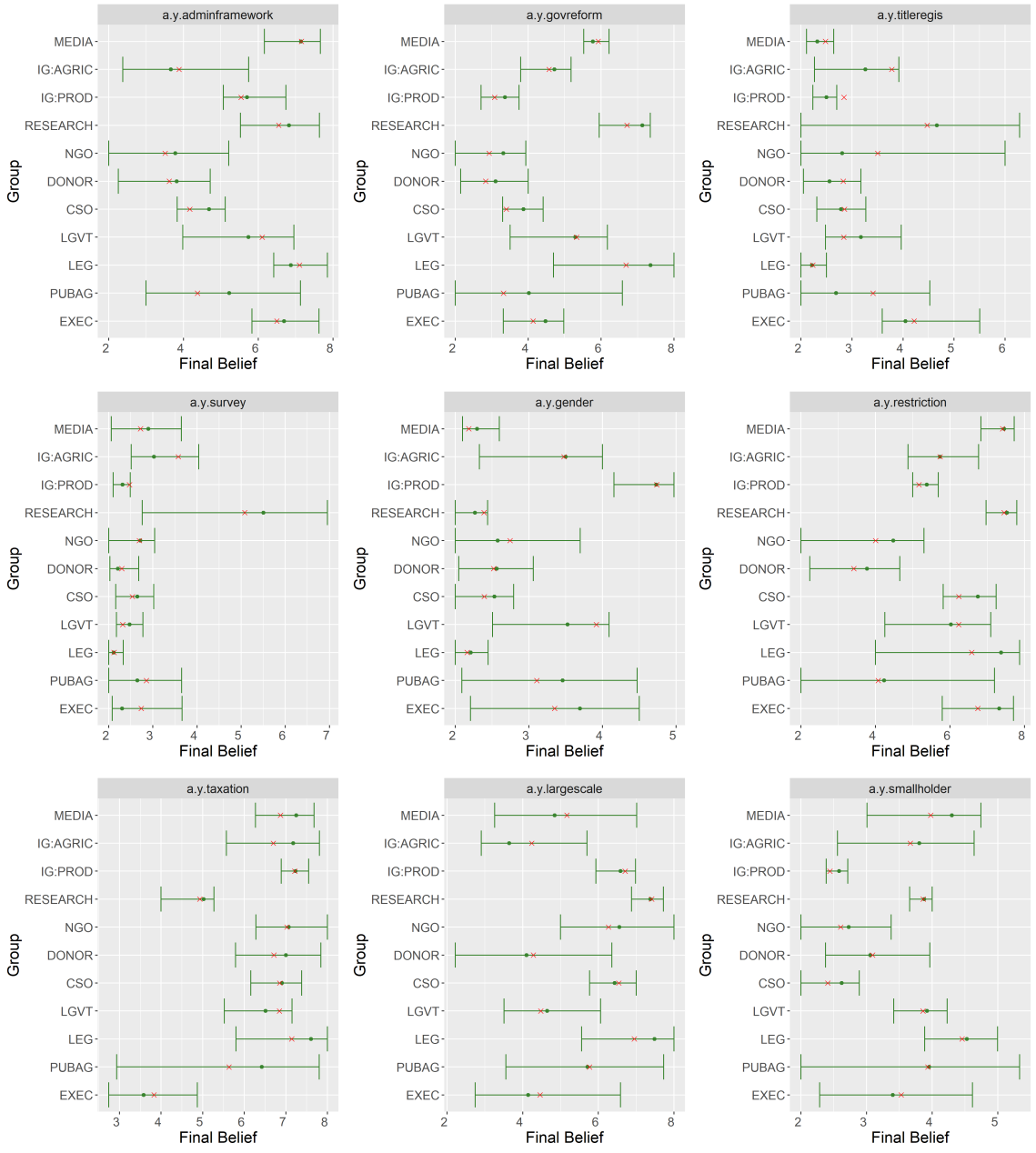
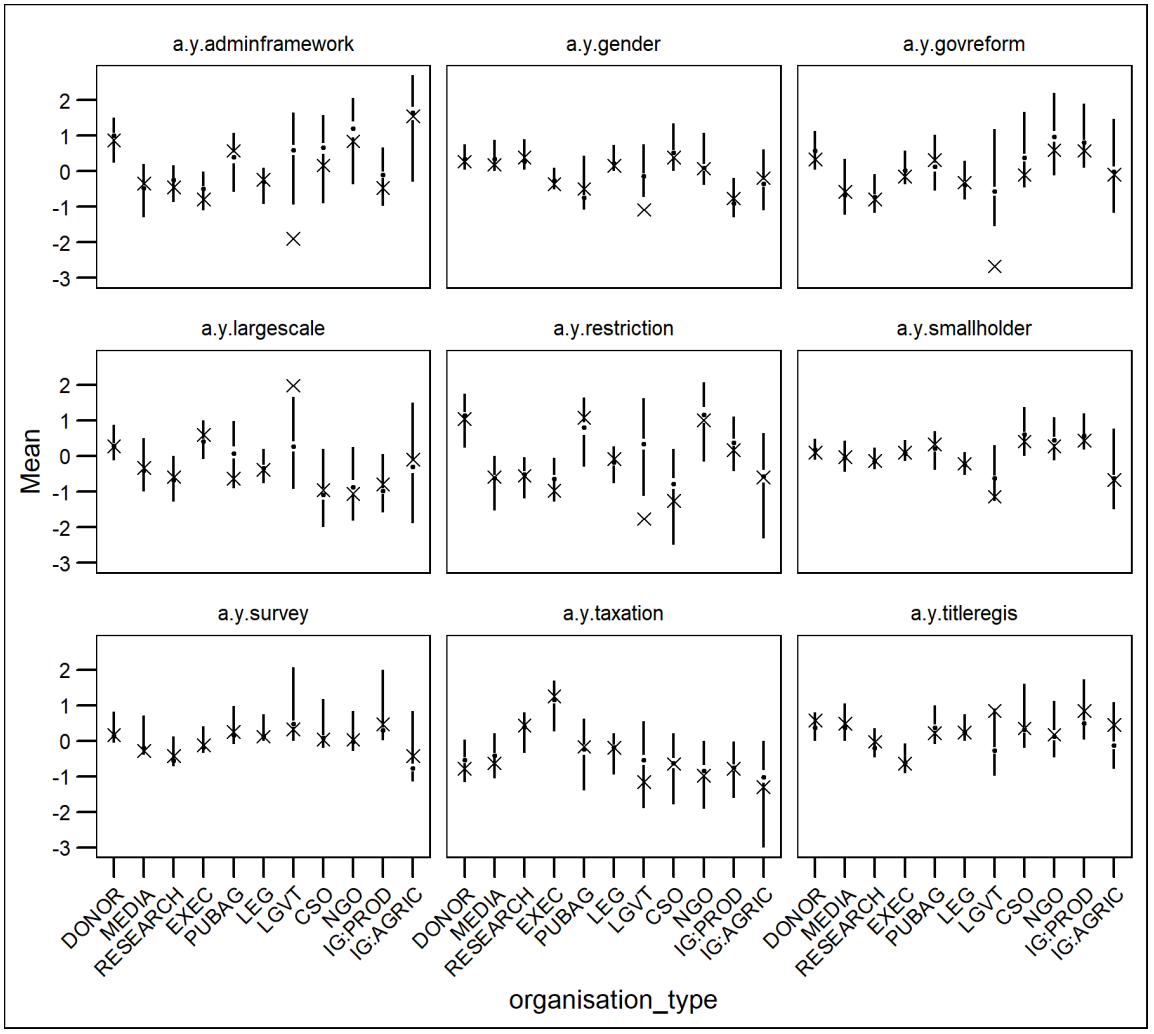


Figure 3.5: Group means of simulation (point) and interview based network (cross) with 0.95 confidence intervals of land rights administration reform policies.

Figure 3.6: Delta group means for 10,000 simulations (points) and realised network (cross) beliefs based on realised network.



3.7 Conclusion

Even though stakeholder engagements have recently been touted in some quarters as a tool that can help drive efficient policy formulation processes, particularly in Sub Saharan Africa where sub-optimal policies persist, there are very few empirical analyses that quantify and observe the underlying influence structures that drive such engagements. In this study, we examine the role of stakeholder's participation in formulating land reform policies and the processes that drive participation. An understanding of these processes is essential because exchange relationships among stakeholder organisations influence policy learning, improves the quality and outcome of policy choices, and drives vital reform programs particularly in the developing world.

Our paper adopts a network-based approach to empirically quantify the influence structures within the Sierra Leone agricultural and land reform policy network. We use a theoretically founded method to calculate two influence indicators: communications and political support multipliers. We also utilize an Exponential Random Graph Method (ERGM) to examine the structural and actor specific attributes that drive network formations. Our analysis demonstrates that the exchange of expert information within Sierra Leone's land reform policy space is dense and very structured. In relation to the policy belief formation process, our results indicate that donors, the executive branch of government, public agencies, and to a lesser extent, research institutes have a huge impact on influencing the policy beliefs of other actors.

Our results also show that policy networks are not entirely driven by stakeholder organisations' need for information to form and update their policy beliefs, but that they are also driven by personal organizational attributes, policy preferences and beliefs and network structures. To this end, our estimated random graph models suggest that there are strong structural effects of mutuality, transitivity and multiplexity as a result of the pre-existence of previous exchange relationships. Furthermore, there are indications that organizations predominantly rely on one another to determine the trust worthiness of an information source and the reliability of providers of political support. This underscores the importance of transaction costs in determining the emergence of networks in Sierra Leone's land policy domain. Moreover, based on our analysis, we can infer that some of the criticisms levelled against stakeholder involvement is also prominent in Sierra Leone's land policy domain. Specifically, the policy formulation process is dominated by donors, the exec-

utive branch of government and public agencies, with other grass-root organizations like farmer groups having little or no influence in the policy formulation process.

We acknowledge that there are some limitations to our results. First, we are cognisance of the fact that our sample is predominantly made up of government actors and donor organization, with media organisations, research institutes, civil society organisations, agricultural producers and industries only having two representatives each, as opposed to 8 and 7 from the executive and donor organisations respectively. As a result, this might account for biases in our communications and political support network towards donors and governmental organisations. Additionally, while we have employed a theoretically founded model in our study, we make no conclusions about how efficient the policy formulation is, in relation to whether or not these exchange relations result in the choice of the most efficient land reform policies. However, we are content that our empirical paper contributes to an understanding of stakeholder engagement as it relates to land reform policy formulation process in Sierra Leone.

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Chapter 4

Land Market Imperfections and Large Scale Land Acquisition in Sierra Leone: A Computable General Equilibrium (CGE) Analysis

Edmond Augustine Kanu, Christian H. C. A. Henning, Alhassane Camara

Abstract

In the context of the new wave of large-scale land transfers from small-holder farmers to large-scale farmers in mostly developing countries, this paper examines the impact of transaction costs and imperfect labour markets on land transfers and their implications on wages, economic growth and welfare in Sierra Leone. Our analysis is based on an integrated modelling framework that combines a static Computable General Equilibrium (CGE) model, a land and labour market module, and a microsimulation poverty module. Overall, our results show that the volume of land transfers rise when transaction cost is low, leading to increases in the annual economic growth rate. However, the welfare effects are mixed. When transaction costs are very high, moderately lowering them makes economic sense because it facilitates the transfer of land from less efficient to more efficient farmers, resulting in welfare improvements for especially small-holder farming households. On the contrary, completely eliminating transaction costs have negative welfare implication. This is because exceedingly low levels of transaction costs allow small-holder farmers to transfer land in excess of what should be leased in a first-best solution, while also flooding the labour market with unskilled labour that depresses both on and off-farm wage rates.

Keywords: Large-scale land Acquisition, CGE Model, Transaction Costs, Sierra Leone.

JEL Codes: Q15, C68, I32, J43.

4.1 Introduction

In the wake of the global financial crisis, the increasing interest in the acquisition of large tracts of land, particularly in the developing world, has garnered considerable attention in the international and local media and among civil society organisations (Die Zeit, 2012; GRAIN, 2008; BBC, 2012; La Via Campesina., 2011). Because of the significant effect the ownership of, or access to, land has on poverty and income levels particularly in rural agrarian communities (Deininger *et al.*, 2017; Department for International Development (DFID), 2003; International Fund for Agricultural Development, 2001; Mukarati *et al.*, 2020), the concentration of these investments in Sub-Saharan Africa (SSA)-a region in which majority of the population depend on the agricultural sector for their livelihoods- has attracted considerable attention from policy-makers, scholars and development practitioners (Borras Jr. *et al.*, 2013; Wisborg, 2013; De Schutter, 2011). This is because land is one of the most important factors of production in agriculture and hence an important determinant of wealth generation (Deininger, 2003).

Competing arguments, both in support of and against large-scale land acquisition, have put forward by both proponents and critics alike. Proponents, including international development organisations like the World Bank, the United Nations Food and Agricultural Organisations (FAO), the International Food Policy Research Institute (IFPRI) hold the view that if properly managed and regulated, large-scale land acquisition could serve as a vehicle for rural development and help provide the much needed investment to facilitate economic development in the developing world (Byerlee and Deininger, 2011; von Braun and Meinzen-Dick, 2009; FAO, 2009). At the national level, these arguments resonate with many policy makers and governments who continue to grapple with issues of food insecurity, high levels of poverty and low levels of productivity of small-holder farmers (UNCTAD, 2009; Sierra Leone Investment and Export Promotion Agency, 2010). Generally, discussions in policy circles about how to address the low levels of productivity and high yield gap between the majority of the countries in SSA and other industrialized nations tend to portray small-holder farmers as inefficient and backward (Mockshell and Birner, 2020). To this end, in addition to being incentivized by the possibility of additional sources of revenue in the form of taxes and land rental fees that they stand to accrue from these investments (Borras and Franco, 2012; Cotula, 2012), some governments have presented large-scale land investments as opportunities to transform their agricultural sectors from their current subsistence and traditional forms to more mechanized and

industrialized sectors (Deininger and Xia, 2016; Lavers, 2012; Messerli *et al.*, 2013; Food and Agriculture Organization, 2014).

However, contrary to claims that there are tons of idle land to be acquired by investors, empirical evidence suggest that small-holder farmers mostly compete with large-scale investors for the same pieces of land (Cotula *et al.*, 2019; Anseeuw *et al.*, 2011; Edelman *et al.*, 2013). That these investments remain concentrated in regions where governance structures are weak, and land rights remain largely informal and undocumented because of archaic land laws and long standing customary institutions, has added another layer of complexity to the land acquisition process (Bottazzi *et al.*, 2016; Bruce and Migot-Adholla, 1994; De Schutter, 2015). In the absence of secure property regimes, competition between large-scale investors and local land users have resulted in some displacements, and in some cases, forced evictions of the latter from land, a situation many critics have infamously come to describe as "land grabbing" (Borras and Franco, 2013; Daniel and Mittal, 2009; GRAIN, 2008; Cotula *et al.*, 2009).

Analogously, a huge body of evidence demonstrates that the absence of formal, documented and secure property right regimes lead to dysfunctional and imperfect factor markets that result in high transaction costs and impede efficient land exchanges (Besley and Ghatak, 2010; Colin and Woodhouse, 2010; Deininger, 2003; Dillon and Barrett, 2017). For land investors, such high levels of transaction costs make land acquisition burdensome and expensive (Andrew and Vlaenderen, 2011; Gingembre, 2015). Thus, as reports of forceful evictions and displacements continue to gain traction in both local and international media, there have been increasing calls for land reform programs that will address land markets imperfections that inhibit the smooth transfer of land between small-holder farmers and large-scale investors. On the one hand, advocates in favour of large-scale investment in agricultural land have called for reforms to end the cumbersome land transfer processes and ensure that the most productive actors can easily have access to land (De Schutter, 2015; Gingembre, 2015; SLIEPA, 2010; Johnson, 2011). On the other hand, civil society organisations and other interest groups have also supported the calls to reform land laws and regulation so as strengthen and protect the tenure security of land users and small-holder farmers (De Schutter, 2015; La Via Campesina., 2011).

But do imperfect factor markets significantly affect the efficiency and distributional effect of these large-scale land transfers? Would a more formalized property right regime that reduces the transaction costs inherent in imperfect land markets lead to a more efficient land acquisition process and would it have any welfare effect(s)? These

questions remain largely unanswered in the literature on large-scale land acquisition. So far, while there is a growing body of evidence that sheds light on the impact of LaSLA on the lives of rural communities (Arndt *et al.*, 2010b; Bottazzi *et al.*, 2018; Kleemann and Thiele, 2015), these studies largely ignore factor market imperfections that exist in most of the locations where Large-Scale Land Acquisition (LaSLA) occur. Since traditional customary tenure systems, particularly in SSA, have long been identified as a source of land market imperfection that prevents the efficient functioning of land and labour markets, (Binswanger and Deininger., 1997; Deininger and Feder, 2001; Deininger and Jin, 2006; Deininger, 2003; Dillon and Barrett, 2017; Saleh, 2004), their distortionary and efficiency effects must therefore be taken into consideration when assessing land transfers within the context of large scale land acquisitions.

Furthermore, even though there is a broad agreement both among critics and proponents that this new wave of land transfers have profound welfare implications (Arndt *et al.*, 2010a; Escobar *et al.*, 2009; Kleemann and Thiele, 2015; Sipangule and Lay, 2015), and despite the voluminous literature about their effects on livelihoods (von Braun and Meinzen-Dick, 2009; Mann and Bonanomi, 2017; Julia and White, 2012; Cramb *et al.*, 2017), questions regarding their welfare effects at the household and national level remain largely unanswered. This is in part because, in addition to the fact that early contributors to the literature focused largely on the sheer size, scale and the speed with which these acquisitions occurred, that the investments were still relatively new and unfolding meant that it was too early to generate enough empirical evidence about their welfare implications (Edelman, 2013; Oya, 2013). Lately, even as studies begin to examine these welfare effects, to date, most have limited their focus on community level assessment and have overlooked the distributional and welfare implications at both the household and country level (Fitawek *et al.*, 2020; Baglioni and Gibbon, 2013; Gebreselassie *et al.*, 2015; Yengoh *et al.*, 2016). Although the insights they provide shed light on some of important channels through which the effects of large-scale land acquisitions are transmitted, they do not provide a comprehensive quantitative assessment of the distributional and welfare effects of these acquisition at both the household and country level.

Our paper contributes to this literature by focusing on the welfare and distributive effects of large-scale land acquisition on poverty and income levels both at the household and economy-wide in Sierra Leone. Primarily because of its suitability in quantifying the economy-wide impacts of policy shocks and their effects on macroeconomic indicators like levels of employment, income, Gross Domestic Product (GDP),

we employ a Computable General Equilibrium Model (CGE) to specifically identify the main channels of transmission through which these land transfers affect economic growth, income distribution and levels of poverty.

Sierra Leone, the focus of our study, makes for an interesting case for several reasons. First, with the country being among the top ten early destinations where large-scale land investment has been intense (The Land Matrix Global Observatory, 2013), the activities of most of these early investments in the country have sufficiently progressed to allow for an examination of their impacts at both the local and household level. Additionally, as sections of local farmers and other land users in the country continue to protest and resist forced eviction from land acquired by large-scale land investors in some of the major land acquisition projects (Reuters Africa, 2016; Oakland Institute, 2012; FIAN, 2019), the country is one of the poster cases of the so-called "land grabbing" situation. However, with the exception of few studies (e.g Bottazzi *et al.*, 2018; Lakoh *et al.*, 2016), there is a very scanty quantitative assessment of the welfare effects and implications at the household and national levels. In this study, we attempt to fill this gap by examining the welfare implications of large-scale transfer of land at both the household and country level in Sierra Leone.

Our paper makes two important contributions to the literature on large-scale land acquisition. First, it provides new insights into how transaction costs, arising from customary land practice and biased beliefs about expected wages to be earned after the land acquisition process, affect land transfer decisions at both the local and national levels. To the best of our knowledge, this is the first paper that examines the extent to which transaction costs and biased beliefs about prospective wage earnings affect the outcome of these investments. Additionally, by quantifying the effects of land transfers on food security, income levels and inequality, we provide further insights into how tenure insecurity affects land-related investments. Research into this topic in SSA is particularly important because a realignment of land holdings, one of the principal factors of production on the sub-continent, is bound to have both local and economy wide implications. Furthermore, large-scale land acquisition policies, if shown to be successful and efficient, could potentially be a policy instrument that could serve as a blueprint in the mechanization of the agricultural sector in most of SSA, and in the process, help combat hunger, poverty, and food security. An empirical evaluation of the welfare effects of such a policy instrument will thus provide governments and development partners with evidence about whether to scale up or abandon similar intervention.

The rest of this paper will be structured as follows: After this introductory section,

the next section will provide an overview of the state of the agricultural sector and the advent of large-scale land acquisition as a policy intervention to surmount the challenges in the sector. This will be followed by an overview of land governance and its implication for the large-scale acquisition of land in Sierra Leone. In Section 4.3, we describe the main attributes of our integrated modelling framework. Section 4.4 presents and discusses the results of our study and in section 4.5, we will summarize our findings and offer conclusions.

4.2 Background and Literature

4.2.1 The Agricultural Sector, Poverty and Large-scale Land Acquisition in Sierra Leone

Emerging from a decade long civil war that had its origin in unequal distribution of resources, and poor governance (Bøås, 2007), Sierra Leone is a small country of 7 million people, with a land mass of approximately 72,000 square kilometres (Statistics Sierra Leone, 2016b). Agriculture is the country's largest sector, contributing to about 50% of its Gross Domestic Product (GDP) and employing 55 percent of its workforce (The World Bank, 2019). Poverty remains endemic in the country, more so in rural areas where 73.9% are classified as poor, compared to 34.8% in urban areas (Statistics Sierra Leone, 2016a). Given that 86.1% of the households in rural areas are classified as agricultural households (Statistics Sierra Leone, 2018, 268), this underscores how pervasive poverty remains in the sector. These dismal poverty indicators have been linked to the low levels of productivity in the agricultural sector. Data from the the government of Sierra Leone indicate that labour productivity in the country's agricultural sector is a third lower than the national average, i.e, about 20 percent lower than in the services sector and 12 percent lower than in the industrial sector (Government of Sierra Leone, 2019). Compared to its nearest neighbours of Guinean and Liberia, there are 16 and 36 percentage points gaps in productivity between the two respective countries and Sierra Leone (World Bank, 2020). Additionally, a yield gap analysis of rice production - Sierra Leone's staple food and most produced and consumed crop- concluded that the percentage yield gap to potential yield between experimental yields and traditionally produced yields stood at 51% (Gborie *et al.*, 2016; Nabay *et al.*, 2017). These low levels of agricultural productivity have left the country dependent on food imports and has contributed to 47.7% of its population being classified as food insecure (World Food

Programme, 2020).

Consequently, successive government policies have sought to improve productivity in the agricultural sector by commercializing subsistence agriculture and promoting medium and large-scale farmers schemes (Ministry of Agriculture Forestry and Food Security, 2009). Implicit in these policy interventions is the belief that subsistence family farms are inefficient and unproductive (Bald and Schröder, 2012). It is against this backdrop that Sierra Leone embraced the idea of transferring land from small-holder farmers to large-scale farmers as part of its efforts to move land from supposedly less productive small-holder farmers to efficient large-scale farmers in a bid to increase productivity in its agricultural sector (Ministry of Agriculture Forestry and Food Security, 2009; Government of Sierra Leone, 2013; Oakland Institute, 2011). To this end, large-scale land acquisition was seen as an opportunity to increase investment in an otherwise investment-starved agricultural sector in a bid to increase productivity and combat food insecurity (Ministry of Agriculture Forestry and Food Security, 2009; Bald and Schröder, 2012; Melsbach and Rahall, 2012; Millar, 2015).

To attract agri-business investors, the government of Sierra Leone granted complete tax exemptions, including from the payment of import duties (Ochiai, 2017a; SLIEPA, 2010). At an investment forum conveyed in the UK in 2009, Sierra Leone's then president wowed investors by claiming that "Our soils are fertile and our land under-cultivated, offering ideal conditions for new investments in rice, oil palm, cocoa, coffee and sugar" (Koroma, 2009). Consequently, between 2009 and 2012, it was estimated that about one-fifth of the country's arable land was leased by foreign investors (Baxter and Schaefter, 2013). According to the land matrix database estimates, by 2015, 773,999 hectares of land deals have been concluded and contracted in Sierra Leone (The Land Matrix Global Observatory, 2016b).

4.2.2 Land governance, Transaction costs and Large-Scale Land Acquisition in Sierra Leone

The literature on land governance in Sierra Leone, as is the case in most of SSA, indicate that it is characterized by archaic land laws and traditions based on colonial legacy and customary practices (Johnson, 2011; Ochiai, 2017b; Bottazzi *et al.*, 2016). Sierra Leone's five geographical zones- the North-West, North-east, South, East and West- operates broadly two land tenure arrangements. The Western area, which

makes up less than 1% of the country's land mass, operates a freehold land tenure system, adopted from colonial rule and based on common law. The central tenets of the free hold systems are that it allows for the private ownership of land and exclusively grants transfer rights to owners without any recourse to a third party. The rest of the country, which makes up about 99% of the land mass, operate a communal land tenure system. This system of land governance is based on historical social hierarchical arrangements in which land rights are claimed mainly along patrilineal inheritance structures and administered based on customary laws and traditions that are largely unwritten and not codified (Unruh and Turray, 2006). The Provinces Land Act of 1960, the legal statute that governs the acquisition of land in these parts of the country, vests all land matters in the hands of the chiefdom council, headed by the Paramount Chiefs, who hold such land for and on behalf of the communities concerned (Renner-Thomas, 2010). Paramount chiefs thus have the legal responsibility of adjudicating between community members during land disputes and are charged with the responsibility of sanctioning and validating all land transactions under their administration and jurisdiction. No land transaction can thus be completed without their expressed approval within their jurisdiction. Statutory law furthermore recognizes both land-owning families and paramount chiefs as owners and legal custodians of land, respectively. As a result of these institutional arrangements, negotiations for the transfer of tenure security under customary law are very complex and require the involvement of land-owning families, paramount chiefs, and the interested party. Land users from landless households are regarded as temporary custodians and are generally excluded from negotiations and are not entitled to compensations for such land transfers.

This land governance system poses significant challenges to the smooth transfer of property rights between and among users, and give rise to substantial transaction costs that prevent the free and efficient exchange of land among users. In the first place, the nature of customary laws make land transfers negotiations cumbersome and time consuming. For instance, extended family members, paramount chiefs and local and central government authorities must all approve any land transfer transaction before it can be completed. Such an elaborate process of getting several parties to agree before land transactions are completed increases the transaction costs involved in the acquisition process.

Additionally, since customary laws are unwritten and uncodified, there is a lack of clarity about the specific rights of individuals and communities under this system of land governance. This is further compounded by the additional difficulty of obtain-

ing regulations about communal land tenure systems. As a result, tenure security is uncertain and enforcements of ownership cumbersome and expensive. Moreover, surveying and demarcation services are obsolete, inadequate and in some cases, outrightly unavailable, making land transfers chaotic. These, among others, have been identified as some of the reasons why around 50 percent of all cases in the country's lower courts are related to land disputes (Moyo and Kamara, 2009). This is further complicated by the fact that there is currently no system of registration of land tiles in the country, making it impossible to ascertain, with certainty, the rightful property owners. Lastly, because land is treated as an inalienable family property under the communal land tenure system, permanent transfer to other interests like foreigners, non-natives and corporations is prohibited. Even in instances of temporary transfers, including leasing, the law restricts foreigners to a 25-year tenancy, with a further option of extending for no more than 21 years.

With the new wave of land acquisition, another layer of complexity that has been added to the already complex land administrative arrangement is the requirement that all land transfers have to be approved by central and local government authorities before they are allowed to go ahead (Baxter and Schaefter, 2013; Oakland Institute, 2012). As part of this process, the guideline from the country's Ministry of Agriculture stipulates that the yearly annual rental fee for all land investments should be distributed among land owners (50%), central government (10%), chiefdom administration (20%), and local government (20%) (Government of Sierra Leone, 2011).

A Review of the Welfare Implications of Large-Scale Land Acquisition

As a result of lingering questions about the livelihood effects of large-scale land acquisition, the welfare implications of these land transfers have gained traction in the international development literature (Arndt *et al.*, 2010a; Borras and Franco, 2012; Edelman *et al.*, 2013; Kleemann and Thiele, 2015). One of the main selling points of large-scale land acquisition is that it has the propensity to create wage employment for a huge segment of subsistence farmers whose low labour productivity levels mean that they are trapped in a vicious poverty circle (Fitawek *et al.*, 2020; Kleemann and Thiele, 2015; Baumgartner *et al.*, 2015). Since the productivity levels of most rural land users are so low that they are largely reliant on markets for their food needs, then, it is generally argued, they would be better off giving up their land holdings to their more efficient large-scale counterparts and seek employment either

on the farms run by these investors or elsewhere and earn higher wages in order to attain a higher standard of living (Byerlee and Deininger, 2011; Hall, 2013).

In most of the countries where large-scale land acquisition has occurred, they have been preceded by promises of job creation in the operational areas (Byerlee and Deininger, 2011; Ali *et al.*, 2016; Daley and Englert, 2010). However, a review of the literature indicates that while the transfer of land has resulted in the creation of some job opportunities, most of the jobs created are either of poor quality or are not permanent (Cotula *et al.*, 2009; Obidzinski *et al.*, 2012; Anseeuw *et al.*, 2011). In Indonesia for instance, Li (2011) found out that the jobs created were far less than what was promised and that not everyone whose land was taken away was employed by the investors. Instead, workers were brought from outside the areas and even those who worked on the plantation were working under poor conditions. Further evidence also suggest that the loss of farmlands and displacement that have resulted from large-scale land investment has not been matched by the number of jobs offered or created by the investors (Melsbach and Rahall, 2012; Yengoh and Armah, 2014; Lustenberger, 2016). In instances where studies found higher wage employment tied to the operations of investors, they concluded that the monthly wages paid to farm workers were lower than average monthly wages (Bottazzi *et al.*, 2018; Kleemann and Thiele, 2015; Fielding *et al.*, 2015; Sipangule and Lay, 2015).

Another principal means through which the operations of large-scale land acquisition affects the welfare of household, and communities in which they operate is their effects on food security (Arndt *et al.*, 2010a; Havnevik *et al.*, 2011; Rosset, 2011; Fitawek *et al.*, 2020). If, on the one hand, investors compete with small-holder farmers for the same plot of land and produce cash crops or export food crops they produce, then that will like lead to food scarcity that could increase food prices. Furthermore, if they produce food crops for the domestic markets, that could lead to an increase in food supply in the market and help bring down prices. Price changes are even more important for farmers who lose their land, willingly or not, during the acquisition process and become reliant on the local market for their food needs.

In the case of Sierra Leone, data from the Land Observatory Matrix suggest that most of the large-scale land acquisition projects are export-oriented and do not produce food crops. Instead, they focus on cash crops, and timber logging (The Land Matrix Global Observatory, 2016a). Empirical evidence on the effects of large-scale land acquisition in the country so far also show mixed results. A randomized control study by Bottazzi *et al.* (2016) in northern Sierra Leone found that while

the income of households increased in areas where investors operated, farmers yields were lower as a result of a 50% reduction in the agricultural production area. Also, Yengoh *et al.* (2016), Millar (2016), and Melsbach and Rahall (2012) all concluded that loss of cultivation area as a result of Large-scale land acquisition has led to a marked reduction in the level of food consumption and poverty in the affected communities.

Lastly, given the low levels of productivity of small-holder farmers in SSA (Jayne *et al.*, 2010), proponents of large-scale land acquisition frequently opine that positive spillover effects that results from the interaction between investors and local farmers have the propensity to increase agricultural productivity of the latter and translate into positive welfare effects. This, it is argued, could be in the form of the adoption of improved agricultural technologies like improved seed and fertilizers or the transfer of modern farming skills (Boamah, 2011; Nolte and Sipangule, 2017; Sipangule and Lay, 2015). Case Studies by Deininger and Xia (2016) and Ali *et al.* (2016) found that to be the case in Mozambique for example.

However, there is very little evidence to suggest that the operations of large-scale land investors have led to any such productivity gains in Sierra Leone. While there are suggestions of infrastructural development in the form of isolated road constructions in the country, the constructions have not been meaningful enough to open markets and positively affect productivity (Baxter and Schaefter, 2013; Fielding *et al.*, 2015; Melsbach and Rahall, 2012). Instead, empirical evidence suggests that negative spillover effects from the operations of large-scale land investors, in the form of over utilization of natural resources like water or deforestation and the pollution of water bodies, have negatively affected agricultural productivity (Baxter and Schaefter, 2013; Millar, 2016; Yengoh *et al.*, 2016). More importantly, even though these studies shed light on the impacts of large-scale land acquisition on rural livelihoods, they have so far failed to provide insights about the magnitude of these effects at the national, community and household level. Our paper contributes to filling this gap by quantifying the impacts of these large-scale acquisition of land in Sierra Leone at the household and country level.

4.3 The Modelling Framework and Data

We examine the impact of imperfect land and labour markets on land transfers in Sierra Leone using a computational modelling framework that corresponds to a static Computable General Equilibrium (CGE) model. The model incorporates a land and labour markets module, and a microsimulation poverty module. In this section, we provide a comprehensive overview of our modelling framework, its structure and data sources.

4.3.1 The Computable General Equilibrium (CGE) Model

CGE models are among the most widely used tools to analyse potential policy impacts that result from economic shocks and structural changes within economies in both developed and developing countries (Bourguignon *et al.*, 1991; Zaki, 2009). Generally, they use a system of equations to represent the structure of an economy, the economic agents within that economy and their behaviours, and the sectors within that economy and their interactions. The main source of data for CGE models are Social Accounting Matrices (SAM), a database that provides a comprehensive overview of the transactions that occur within an economy for a given period of time, usually one year (Mainar-Causapé *et al.*, 2020).

We opt for CGE models for a number of reasons. Firstly, they have proven to be one of the most reliable policy evaluation tools in developing countries because of their structural flexibility. Specifically, CGE models allow for extensions that capture peculiarity like imperfect labour and land markets inherent in developing economies (Cockburn *et al.*, 2014). Accordingly, our study takes advantage of this structural flexibility to model both land and labour imperfections and measure their impact on large-scale land acquisition in Sierra Leone. Secondly, many policy analysts have turned to CGE models because their main data source, the Social Accounting Matrix (SAM), do not require enormous statistical data (Zaki, 2009). To this end, our choice of a CGE modelling framework ensures that we do not have to contend with the difficulty of obtaining accurate, consistent and reliable statistical data that continue to plague developing countries like Sierra Leone. Thirdly, we choose a CGE modelling framework because it is suitable for quantifying the economy-wide impacts of policy shocks and their effects on macroeconomic indicators like levels of employment, income, Gross Domestic Product (GDP) and sectoral expansions and contractions among others (Löfgren *et al.*, 2002; Chitiga and Mabugu, 2008).

To this end, our modelling framework will allow for the examination of the sectoral interactions that result from economic shocks like the large-scale transfer of land from small-holder farmers to large-scale land investors.

The Sierra Leone CGE Model

Our CGE modelling framework is based on the EXTER model developed by Decaluwé *et al.* (2001). Accordingly, we adopt a number of the model's assumptions. First, consistent with the Sierra Leone economy, our model assumes a small open economy structure where producers are price takers with no influence on the world market. The model also assumes that exported products from the rest of the world into the domestic market are not perfectly substitutable with those produced locally. In the domestic market, while labour is assumed to be freely mobile across production activities, capital is less so and instead specific to each sector. However, all factors of production are assumed to be immobile between the domestic economy and the rest of the world. Additionally, we assume that firms employ factors of production up to a point where marginal revenue is equal to marginal cost, subject to their relative prices. Equally, firms are assumed to combine factors of production with other intermediate products from other sectors in their production activities. Firms are also assumed to either use their revenue for investment or savings purposes, while households use their earned income for consumption or savings purposes. Finally, prices in our model are normalized and the Leone currency is merely used as a unit of account. Accordingly, price changes are assumed to only influence production and consumption decisions.

Model Structure

Our model structure assumes that firms in the Sierra Leone economy operate in a perfectly competitive market with a constant return to scale. Individual firms maximize their profits subject to a nested production function as shown in figure 4.1. At the top level, the sectoral output of each activity is derived by combining total intermediate consumption and value added in fixed proportions, following a Leontief production function. At the second level, a constant elasticity of substitution (CES) production technology is used to model the imperfect substitution between the composite factors of capital, labour and land based on their relative prices. Furthermore, international trade is modelled by employing the Armington assumption that imported goods from foreign markets are imperfect substitutes for domestically

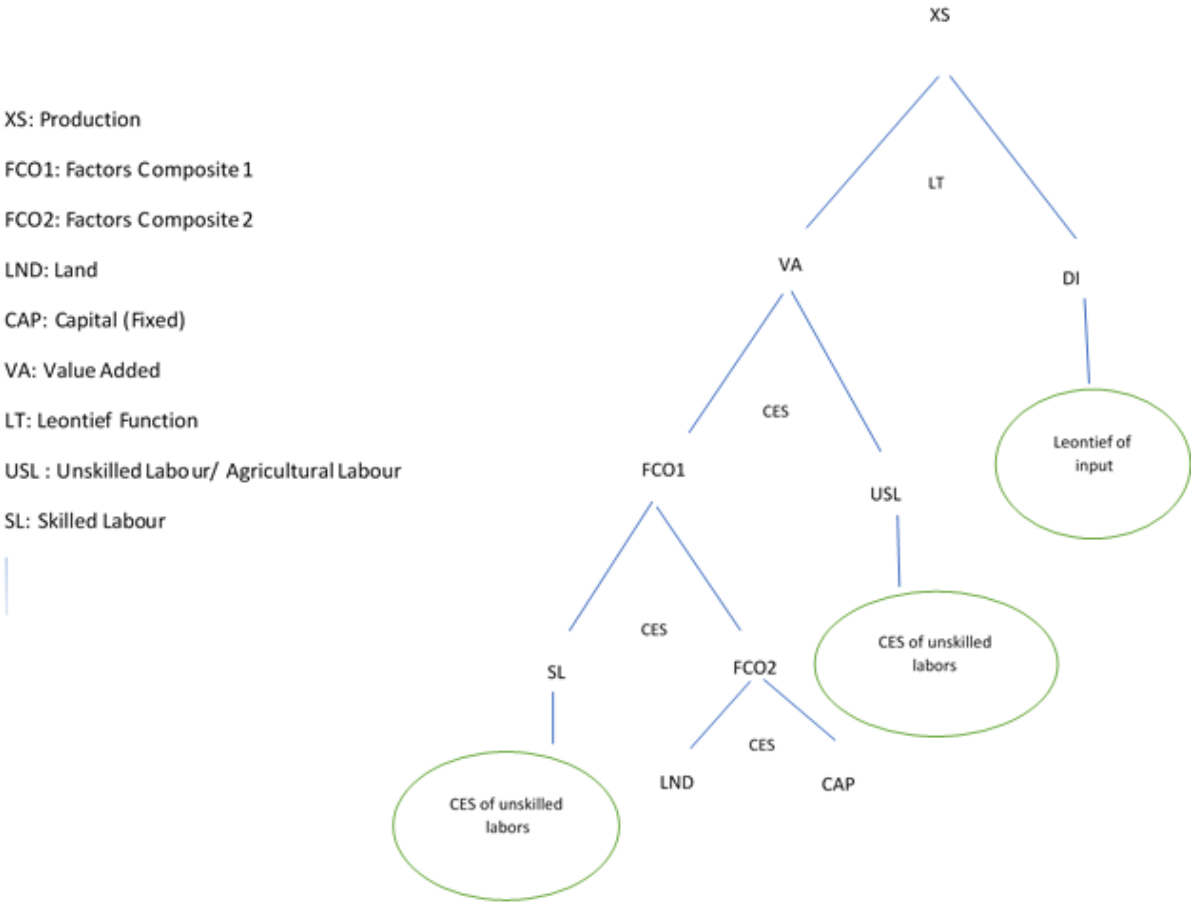
produced goods and vice versa (Armington, 1969). Accordingly, we model imported goods as imperfectly substitutable for local goods using the constant elasticity of substitution function. Similarly, to account for both time and quality related differences between exported and domestic products, we use a constant elasticity of transformation function (CET) to represent the imperfect substitutability between the two types of products.

The principal sources of income in our model are capital income, labour income, land rents and transfers made by other agents. Households earned their income from wages and salaries they receive for labour, dividends from firms, rents from land and transfers from other agents. Consumption and saving patterns are specified using a Linear expenditure system (LES). Such a specification ensures that our model is able to measure changes in how income is distributed across different household types as a result of land transfers. Firms' sole source of income is capital income, while the government's income comes from a variety of direct income taxes from households and firms, indirect taxes from other agents and production activities, import and export duties, and transfers it receives from other agents in the model. The government uses the collected revenue to fund public expenditure, and transfers to other agents. Government's savings is therefore simply the difference between the income it collects, in the form of the revenues, and its consumptions and transfers it to other agents in the model.

Incorporating Imperfect land markets in the Model

Land, one of the most important factors of production in the agricultural sector, has received considerable attention in policy modelling because of its uniqueness (Hertel and Rose, 2009; Tyner, 2018; Zhao *et al.*, 2020). In the first place, because it is heterogeneous in value, when land is used by different actors with different inputs, it can result in contrasting levels of productivity across diverse uses and sectors. Moreover, land is generally regarded as a sluggish factor of production since it is fixed in both supply and location (Hertel and Rose, 2009). This immobility of land across uses and sectors are further complicated by imperfect land markets. In some cases, land market imperfections are linked to high transaction costs that arises from the high cost of converting unproductive land to productive use, and archaic customary practices and national land laws that do not allow for the free and efficient exchange of land across different sectors (Colin and Woodhouse, 2010; Ciaian and Swinnen, 2006). For instance, there have been suggestions that customary land laws

Figure 4.1: Model Stucture.



in Sierra Leone prevent the transfer of land from less productive to more efficient users who might have more capital, skills and other inputs to make the most of it (Johnson, 2011; Moyo and Kamara, 2009).

One of the most common technologies used in modelling land market imperfections in CGE analysis is the nested Constant elasticity of transformation (CET) production function. This functional form uses a substitution elasticity to transform land across alternative uses based on a productivity parameter, a share parameter, and an elasticity of substitution parameter (Hertel and Rose, 2009; Tyner, 2018; Zhao *et al.*, 2020). Typically, based on a CET technology, land is valued based on its productivity. This allows for a steady transformation response as relative prices of different land types change, thus capturing the gradual supply responses that reflect the sluggish transformation of land suitability for specific uses.

Other scholars have used the Constant Elasticity of Substitution (CES) production function to model land use. In a CGE analysis of the gender implications of Biofuel

expansion in Mozambique, Arndt *et al.* (2010b) used a CES nested production technology to model the imperfect substitutability of the factors of production (land, labour and capital) based on their relative prices. Also, in various studies evaluating the impact of land redistribution in Zimbabwe, Mukarati *et al.* (2020) and Chitiga and Mabugu (2008) used the CES functional form to imperfectly substitute the composite factors of capital, labour and land.

To incorporate land market imperfections in our model, we assume that customary land tenure arrangements and land laws and regulations result in high transaction costs that lead to a sluggish land exchange process between large-scale investors and small-scale farmers. To measure the resulting effect of transaction costs on the functioning of land and labour markets, we assume that there is a fixed amount of land that is available to both large-scale land investors and small-holder farmers. We then model the transfer of land between the two alternative uses using a Constant Elasticity of transformation (CES) production function, as shown in equations 4.3 and 4.4. To this end, since different share and elasticity parameters more or less result in asymmetric solutions that are either far away or closer to a functional market situation, we start by assuming that customary land laws result in high transaction costs, while fully functional markets result in low transaction costs. Based on this assumption, land market imperfection shocks are then captured in our model by changing the share and elasticity parameters of our CES function in a way that brings us closer to either an efficient functioning of the land market as a result of zero or low transaction cost or an imperfect market solution where transaction costs are high.

Accordingly, as shown in equation 4.1, land market is in equilibrium, for each type of farmer, when the total amount of land supplied is equal to the total amount of land demanded. Land prices are also modelled to capture transactions costs as represented in equation 4.2.

$$XL(f) + TD\_land(f) = QDF(f, "LANN") \tag{4.1}$$

$$B1(f) - B - p\_alpha0(f) - 2p\_alpha1(f) * TD\_land(f) = 0 \tag{4.2}$$

$$Y(f) = \delta(f).\sum_{f}(\mu_{fb,f}).QDF_{fb,f}^{\rho_f} \tag{4.3}$$

$$Y_f = \delta_f.\left(\sum_{f}\mu_{fb,f}.QDF_{fb,f}^{\rho_f}\right)^{\frac{-1}{\rho_f}} \tag{4.4}$$

Where

$XL(f)$	Total land supplied to farmtype f
$TD\_land(f)$	Traded land by farm type
$QDF(f,"LANN")$	Farm type f demand for factors of production
$B1(f)$	Price of factor including transactions costs
B	Equilibrium land price
p_alpha	Transaction cost
$Y(f)$	Produced output by farm type
$\mu_{fb,f}$	CES-share parameter
ρ_f	CES-elasticitiy parameter
$\delta(f)$	CES-productivity constant

Incorporating Imperfect labour markets in the Model

One of the biggest selling points of large-scale land acquisition is that farmers can lease their land to foreign investors for a sizeable compensation and yearly land lease fee, while still securing employment on the farm of the investor at an even higher wage rate (White *et al.*, 2012; Ullenberg, 2009; Mann and Bonanomi, 2017; Fielding *et al.*, 2015). However, in reality, only a limited number of farmers who lose their land are likely to be employed by large-scale farmers either because large-scale farmers are more capital intensive-and hence require only a limited amount of manpower, or because small-holder farmers do not have the prerequisite skills needed by large-scale land investors (Kleemann and Thiele, 2015).

Thus, we assume that in Sierra Leone's land market, small-holder farmers hold biased beliefs about the average labour wage rate they expect to receive in the large-scale farm sector and other off-farming activities should they decide to transfer their land and offer their serives and expertise to the labour market. Thus, we introduce an expected off-farm wage rate in our model which is exogenously fixed at a rate that is two times higher than the observed off-farm wage rate.

Furthermore, in our modelling framework, we also assume two separate imperfect labour market. In the first market, small-scale farm labour is demanded by small-scale farm production activities and off farm activities, and exogenously supplied by small-scale farm-households to both on-farm and off-farm activities. In the second market, all other sectors, including the large-scale farm sector and non-agricultural sector, demand labour from a general labour market. All other households are assumed to be fixed suppliers of labour to the general labour market. A Constant Elasticity of Transformation (CET) function is then used to model the total labour supply of small-scale farm households into on-farm and off-farm labour. The following equations below depict the labour market representation in our model:

$$LSF\_ON = \sum_{SHF_j} (LDO_{SHF_j}); \tag{4.5}$$

$$LSF\_OFF = \sum_{LAB_{SMH}} \left(\frac{YF_{(SMH,LAB)}}{WF_{LAB}} \right) - LSF\_ON \tag{4.6}$$

$$TLS_{SMH} = LSF\_ON + LSF\_OFF \tag{4.7}$$

$$TLS_{OHT} = LS - LSF\_OFF \tag{4.8}$$

Labour supply transformation (CET) function

$$QS_{Lab} = \alpha_{LS} * ((\delta_{LS} * (LSF\_ON)^{\rho}) + (1 - \delta) * (LSF\_OFF)^{\rho})^{\frac{1}{\rho}} \tag{4.9}$$

Where

LSF_ON	On-farm labour supply of small-scale farm households
LSF_OFF	Off-farm labour supply of small-scale farm households
$QF_{SHF,LAB}$	Demand for labour from small-holder farming activity
SHF	Small-holder farming activity
$TLSSMH$	Total labour supply of small-scale farm households
TLS_{OHT}	Total off-farm labour supply by other households
$bsfo$	Belief-wage by small-scale farm households
$WR_{on-farm}$	Wage rate of on-farm labour
$WR_{off-farm}$	Wage rate of off-farm labour
LS	Total labour supply

4.3.2 Micro Simulation Module: A Micro-Accounting Approach

While CGE models are apt at quantifying the impact of policy shocks at the macro and sectoral level, they do not measure how these shocks are transmitted at the household level. Generally, external shocks resulting from policy or structural changes are transmitted to households through changes in the price of consumer goods and services, and production factors. To capture how these shocks at the macro level are transmitted at the household level, Chen and Ravallion (2004) proposed the extension of CGE models with additional microsimulation models. Microsimulation models have since become a staple in the literature and are used in combination with CGE models to measure the extent to which economic shocks at the macro level are transmitted to the household level.

Also, we follow a similar approach proposed by Robilliard and Robinson (2003) and Tiberti *et al.* (2018) and adopt a top down approach to model both the macro and micro effects of imperfect land and labour markets on land transfers in Sierra Leone. At the top level, we use a CGE model to assess the macro effects of imperfect land and labour markets on land transfer, while at the bottom level, the macro changes in income and price levels from the CGE are used to calculate the new vectors of

prices and income at the household level.

To implement this, we start by calibrating our micro simulation model using the 2018 integrated household survey data. Next, endogenous changes in the household consumption and commodity prices, as well as economic spillovers at the macro level - estimated by our computable general equilibrium model- are then transmitted to our microsimulation model by linking each of the households in the latter to their corresponding equivalent household groups in the macro CGE model. These transmitted changes are then used to calculate the impact of imperfect land and labour markets on levels of poverty and levels of inequality.

Also, using a non-parametric simulation method, we also measure the level of poverty in our study area based on indices that belong to the Foster-Greer-Thorbecke (FGT) family of poverty measures. The FGT poverty indices, as shown in equations 4.10 - 4.12, are used to calculate the poverty headcount.

Using z as the poverty line, poverty and inequality analysis are undertaken based on the following equations:

$$FGT_0 = \frac{1}{N}\sum_{h=1}^{H} I(z < \tilde{c}) \tag{4.10}$$

$$FGT_1 = \frac{1}{N}\sum_{h=1}^{H} I(z - \tilde{c}) \tag{4.11}$$

$$FGT_2 = \frac{1}{N}\sum_{h=1}^{H} I(z - \tilde{c})^2 \tag{4.12}$$

where z represents the poverty line, N, the number of households in the survey, $\tilde{c}$ the expenditure of household n and $I(z < \tilde{c})$ and $I(z - \tilde{c})$ indicator functions. FGT_0 measures the incidence of poverty by estimating the poverty headcount ratio. It is one of the most widely applied poverty measure to quantify the proportion of poor people. Also, FGT_1 measures the depth of poverty, that is, the poverty gap, by quantifying the proportion of the population below the poverty line. Finally, FGT_2 measures the severity of poverty by squaring the normalised poverty gap to allow for weighting.

Further, based on the underlying assumption that a marginal increase in disposable income is attributed to consumer expenditures (Tiberti *et al.*, 2018), we estimate

the household expenditure budget and the new consumption expenditure per capita as follows:

$$C_h^1 = C_h^0 + \Delta \Upsilon_h \tag{4.13}$$

$$\frac{C_h^0}{\pi_{k=1}^{k} \left(\frac{p_k^1}{p_k^0}\right)^{\sigma_{h,k}}} \tag{4.14}$$

Where

C_h^0	Consumption expenditure per capita before simulation
C_h^1	Consumption expenditure per capita after simulation
$\Delta \Upsilon_h$	change in disposable income per capita

Finally, to measure the distribution of income that result from the transfer of land, we calculate a Gini Index using equation 4.15.

$$I = \int_0^1 (s - L(s))v(s;\epsilon)\, dp \tag{4.15}$$

4.3.3 Model closure

The closure rule in our model is investment driven. Hence, investment adjusts to achieve a state of equilibrium. To this end, we fix foreign savings and public expenditure, whereas we allow domestic savings to be flexible. The exchange rate is also fixed and acts as a numeraire, as the price index is allowed to be flexible in order to keep the current account fixed.

4.3.4 Data sources

We calibrate our model using a 2015 Social Accounting Matrix (SAM) for Sierra Leone constructed by the African Growth and Development Policy (AGRODEP) Modeling Consortium (Fofana *et al.*, 2014). Before the calibration process, following from Traoré *et al.* (2019), we employed the cross-entropy method to update the SAM to a 2018 version using data from the World Bank (The World Bank, 2019). To allow for a detailed analysis of the land transfers between different farm types, the agricultural sector, labour and household accounts were further disaggregated. Based on available agricultural census data, our initial SAM, which comprised of 6 main sectors and industries, was expanded to 12 sectors and industries by disaggregating the agricultural sector into the following four sub-sectors: Small-holder cropping, Large-scale investor cropping, Livestock, Forestry and Fishery (Braima and Turay, 2017; Statistics Sierra Leone, 2015; The World Bank, 2015). The initial factors of production in our SAM were capital and labour. The capital account was further disaggregated into three accounts; capital, land holding of small-holder farmers, and land holdings of large-scale farmers. The initial SAM had only one household. This was disaggregated into Rural and Urban Households types using the 2018 integrated household survey and the 2015 population and housing census data (Statistics Sierra Leone, 2016a, 2018). After the disaggregation exercise, our final SAM had a total of 43 accounts.

4.4 Simulations and results

4.4.1 Baseline Scenario

We produce a baseline situation that assumes that there is a fixed endowment of 5.4 million hectares of arable land in Sierra Leone that can either be leased to large-scale land investors or cultivated by small-holder farmers (Statistics Sierra Leone, 2018). However, the predominately rudimentary slash and burn system of farming in the country means that a fallow period is needed to allow for soil fertility and vegetation to sufficiently recover for future use (Bald and Schröder, 2012). Additionally, a plethora of poor road network cuts off large tracts of land in most parts of the country, further limiting the amount of land available for cultivation. Thus, using current census data and information from the land observatory matrix, we model land holdings based on the assumption that 3,447,803 hectares of land are cultivated

by small-holder farmers, while 414,963 hectares are currently held and cultivated by large scale land investors (Gboku *et al.*, 2017; The Land Matrix Global Observatory, 2016a).

Our baseline scenario also assumes that after land has been acquired by investors, previous land users can either work on the farm of the investors or offer their labour in the general labour market - also interchangeably referred to as off-farm labour market. Following Kleemann and Thiele (2015), we assume that the majority of small-holder farmers whose land are acquired by large-scale farmers reduce their on-farm labour supply and increase their labour supply to off-farm activities.

Furthermore, as noted earlier, empirical evidence suggests that the productivity of small-holder farmers is the lowest when compared to other industries both within Sierra Leone, but also when compared to other small-holder farmers in the neighbouring countries of Guinea and Liberia (Government of Sierra Leone, 2019). We account for these differences in skills intensities in the labour force by allowing for the productivity of large-scale farmers to be three times higher than small-holder farmers. We also assume that large-scale farmers are five times more efficient in land-use than their small-holder counterparts.

Together, these assumptions produce a baseline scenario in which the process of land transfers from small-holder farmers to large-scale investors commences when transaction costs in the land market are assumed to be zero and labour markets are assumed to be imperfect. For each year, we update our model to reflect changes in transaction costs. Beginning from an effectively zero base, we increase the transaction costs in the land market by 1 % over a 10-year simulation horizon and measure its effects on land transfers, on and off-farm labour supply, wage rates, and its welfare effects at both the households and sectoral levels.

4.4.2 Simulations

Since the main aim of our study is to disentangle the effects of land and labour market imperfections from other effects associated with large-scale transfer of land between small-holders and large-scale farmers, to achieve this objective, in addition to our baseline run, we implement the following two additional simulations:

1. In simulation one, we decrease the productivity differences between large-scale farm investors and small-holder farmers from three to one point five. We also

hold constant the assumptions in our baseline that the land use efficiency of large-scale farmers is five times higher than their small-holder counterparts, and that there is a high level of labour market rigidity across the two farming sectors. We then gradually increase the transaction costs in land markets by 1 % over a 10-year simulation horizon. Comparing the baseline run and the first simulation allows for the isolation of the effect of the differences in labour productivity between large-scale land investors and small-holder farmers.

2. In simulation two, we hold constant the assumption in our baseline run that the productivity of large-scale land farmers are three times higher than small-holder farmers. We also continue to assume that there is high labour market rigidity. However, we reduce the land-use efficiency gap between large-scale farmers and small-holder farmers from five to two. Then, similar to our base run, we increase the transaction costs in land markets by 1 % over a 10-year simulation horizon. Comparing the baseline scenario to simulation two allows for the isolation of the effect of efficiency in land use in our model.

4.4.3 Results and Discussions

Effects of Transaction Costs on Land Transfers and Wages

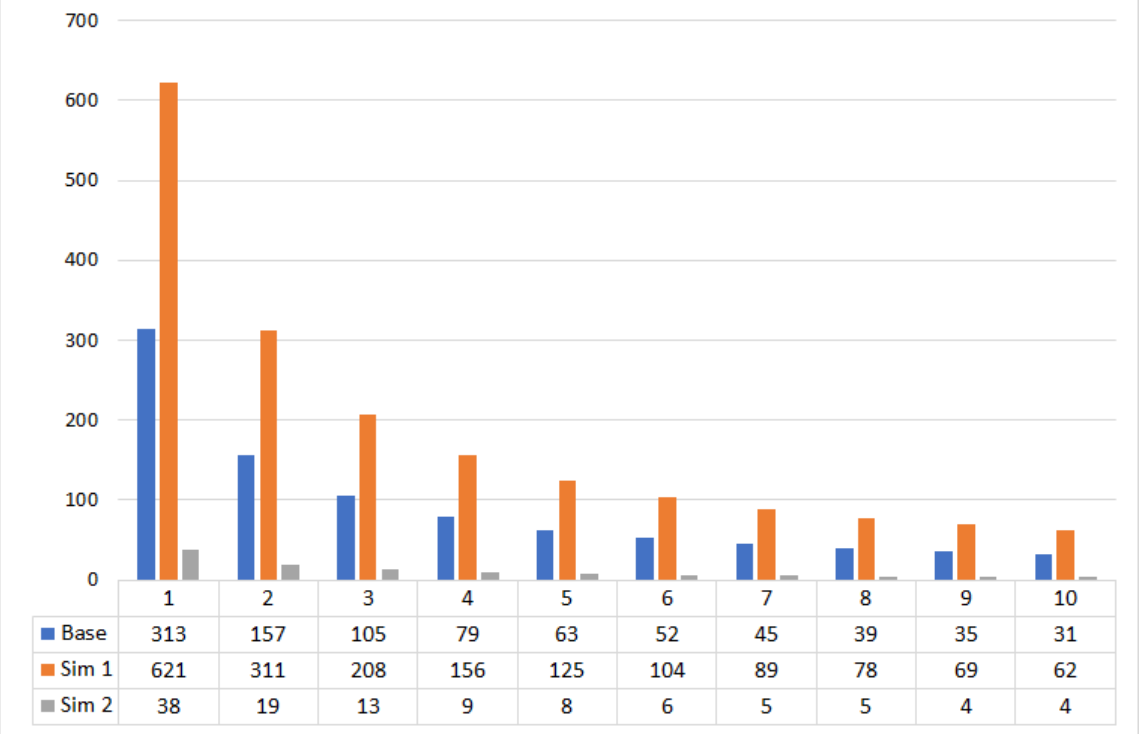
Our results, shown in 4.2, indicate that lower levels of transaction costs result in higher volumes of land transfers from small-holder farmers to large-scale investors and vice versa. However, the magnitude of the volume of land transferred vary based on the differentials in labour productivity and land use efficiency between small-holder farmers and their large-scale counterparts. As shown in figure 4.2, more land is transferred in simulation 1 than in the baseline. However, the opposite is true for the second scenario, where significantly less land is transferred than in the baseline.

The reason for the variation in the volume of land transferred between the baseline scenario and simulation 1 can be attributed, in part, to the different land prices that results from labour productivity differences. Our model results, presented in 4.3 show that land prices are more than two times higher when differences in labour productivity between large-scale farmers and small-holder farmers are reduced from five to three. Specifically, land prices increase from 6.95% in our base scenario to 14.81% in simulation one. The higher land price influences small-holder farmers to increase the amount of land transferred to large-scale farmers, leading to an

increment in their land revenue from an average of 3.58% in the baseline to 7.18% in simulation one.

On the contrary, compared to the baseline scenario, in simulation two, when the land use efficiency gap between large-scale farmers and small-holder farmers are reduced from five to three, the price of land, and the corresponding land revenue, only increases by 0.81% and 0.44% respectively. Similarly, as illustrated in figure 4.3, the moderate change in land prices manifest itself via slight changes in land traded, wage rates and labour supply. The minimal increase in land prices could be attributed to the possibility that when the land use efficiency differences are not very high, large-scale farmers conclude that the probability of increasing productivity levels on land that is already efficiently cultivated is low. Hence, their demand for such portions of land only marginally increases. The negligible increase in the land prices means that small-holder farmers are less willing to transfer a significant portion of their land holdings to large-scale farmers under this scenario.

Figure 4.2: Effects of transaction costs on volumes of land transfers (000 ha)



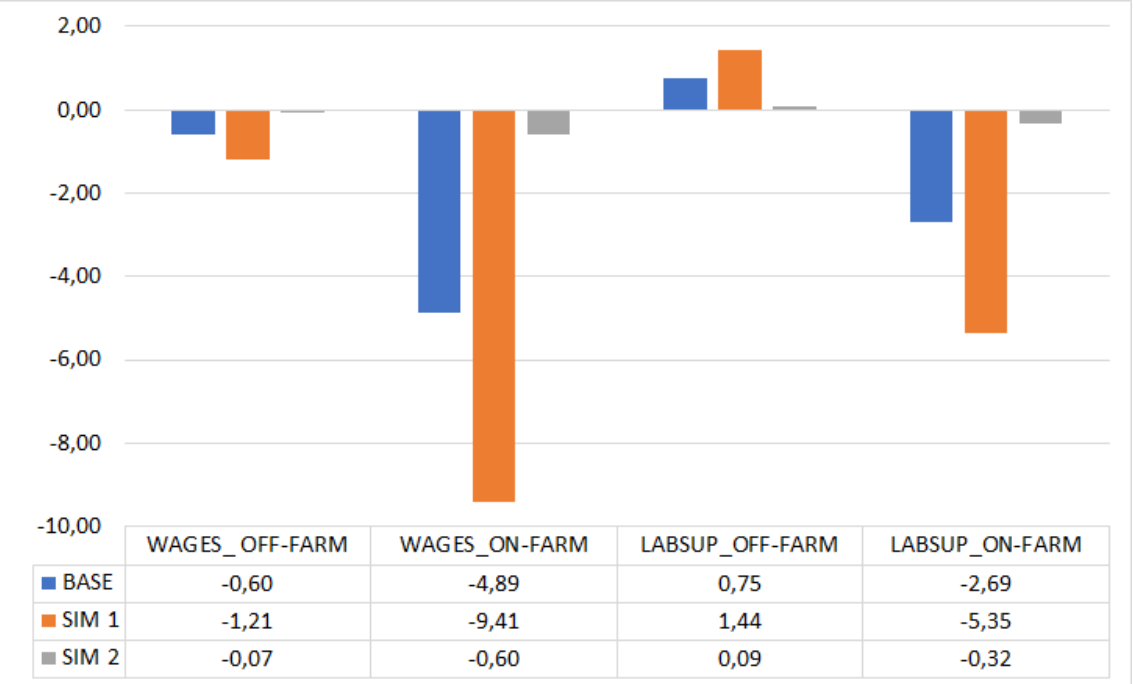
	1	2	3	4	5	6	7	8	9	10
Base	313	157	105	79	63	52	45	39	35	31
Sim 1	621	311	208	156	125	104	89	78	69	62
Sim 2	38	19	13	9	8	6	5	5	4	4

Source: Own presentation of simulation results

Our model results also indicate that transaction costs in land markets have labour market implications. As can be seen from our baseline results in 4.3, at lower levels of transaction costs, the amount of labour demanded by, and labour supplied to on-farm activities declines. This is principally because, as higher volumes of land are transferred from small-holder farmers to large-scale investors as a result of lower levels of transaction cost, the on-farm labour demand of small-holder farming households will reduce since they will be left with a reduced stock of land to cultivate. The surplus labour from small-holders farming households will then be offered to off-farm activities. The reduction in the labour demand for on-farm activities and the increase in the labour supply to off-farm activities leads to a reduction of the shadow price of both off-farm and on-farm labour. The decline in off-farm and off-farm wages can mainly be attributed to the excess supply of labour that emanates from the increase in the labour supply of small-holder farmers to off-farm activities. However, when the decline in on-farm wage rates are compared with off-farm wage rates, we observe that the reduction is large in the former than in the latter.

Furthermore, when comparing the baseline scenario to simulation one- where differences in labour productivity between large-scale farmers and small-holder farmers are halved, results show that more land is traded in the latter case than in the former. This is mainly because a reduction in the labour productivity between large-scale and small-holder farmers increases the price of land from 6.95% in our base scenario to 14.81% in simulation one. This causes small-holder farmers to increase the amount of land transferred to large-scale farmers, leading to an increase in their land revenue from an average of 3.58% in the baseline to 7.18% in simulation one over the 10 year period.

Figure 4.3: Effects of imperfect land and labour markets on wages and labour supply (Average Percentage changes: 2008-2018)



	WAGES_OFF-FARM	WAGES_ON-FARM	LABSUP_OFF-FARM	LABSUP_ON-FARM
BASE	-0,60	-4,89	0,75	-2,69
SIM 1	-1,21	-9,41	1,44	-5,35
SIM 2	-0,07	-0,60	0,09	-0,32

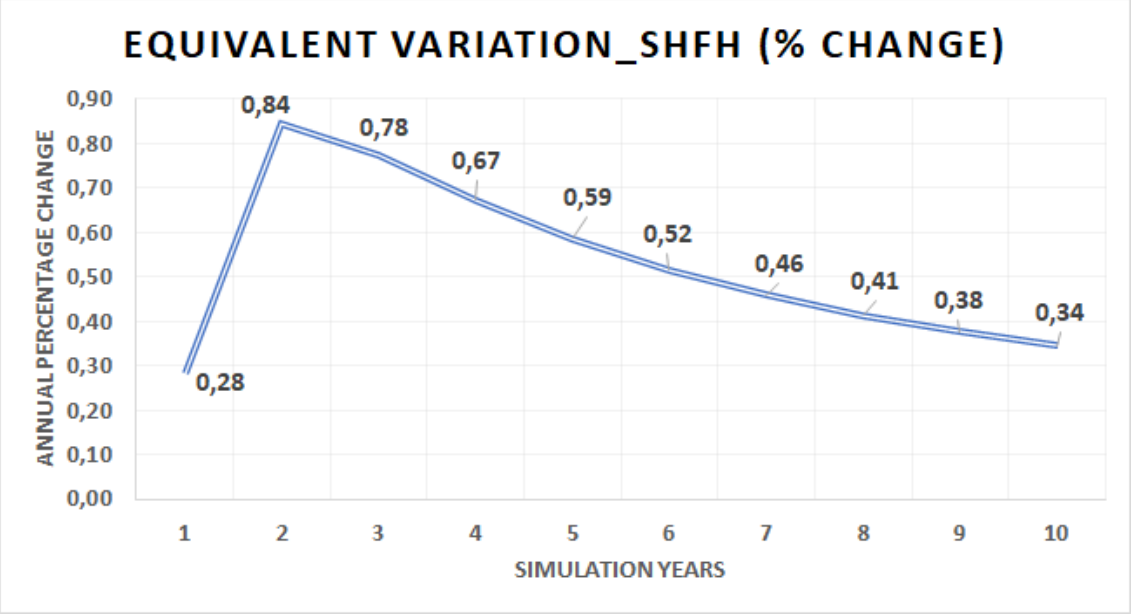
Source: Own presentation of simulation results

Welfare Implications of Changes in Transaction Costs

We use equivalent variation (EV), a measure of welfare after accounting for price changes, to ascertain the welfare implications of transaction costs in imperfect land and labour markets in Sierra Leone. At high levels of transaction costs, our results show that welfare gains of small-holder farmers are very low. However, as transaction costs decline and approaches zero, small-holder farmers benefit from welfare improvements up to a cut-off point where the welfare gains begin to reduce and tend towards negative. The reason for this is because, as transaction costs reduce, small-holder farmers lease increasing amount of land to large-scale farmers based on the belief that they will receive rental fees, and simultaneously offer their labour for a higher wage rate on the off-farm labour market. Yet, as depicted in figures 4.4 and 4.5, as transaction costs keep declining, so does the wage rates for both on and off-farm activities. The continuous fall in wages eventually lead to a negative equivalent variation because, as can be seen from our graph in figure 4.2, at zero transaction costs, small-holder farmers lease large portions of their land holdings to large-scale

farmers. Even though this leads to an increase in the income levels of small-holder farmers, it also results in a reduction of their production capacity because their stock of land holdings needed for food production declines. The outcome is a decrease in the production and supply of food to local markets, and hence, an increased dependence on local markets to meet food needs. The resulting pressure on the local food market leads to an increase in the price of food commodities. Since the eventual increase in food expenditure is higher than the total revenue small-holder farmers realise from both land transfers and wages, the outcome is a negative welfare effect

Figure 4.4: Equivalent variation results in Baseline Scenario



Comparing the results in our base scenario with the other two simulations, we realise that the EV is higher in the baseline scenario than in the first simulation. The reason for this is mainly because, at a higher level of labour productivity and average wage rate, small-holder farmers transfer much more land to large-scale investors than in the base scenario, leaving them with less land available to locally produce food. As a result, supply of food in the market reduces simultaneously as small-holder farmers dependence on the local market for their food needs grow. As shown in 4.5, this leads to increases in food prices by 1.63 %. The opposite is true for the baseline and simulation two, where, because of lower levels of labour productivity, small-holder farmers transfer less land to large-scale farmers and use the additional land to locally produce food. The effect is that average food prices reduce by 0.30% and 0.24% respectively. However, because of the increased revenue accrued to small-holder households in the baseline compared to scenario two, the EV is higher in the

former than in the latter.

Figure 4.5: Welfare effects of land transfers across all scenarios(Average annual percentage changes: 2008-2018)

	CONS	FOOD PRICES	LAND INCOME_SHF	TOTAL INCOME_SHF	EV_SHF
BASE	0,74	-0,30	3,58	-0,47	0,53
SIM 1	1,78	1,63	7,18	-0,87	0,38
SIM 2	0,09	-0,24	0,44	-0,06	0,13

The main takeaway from this is that when transaction costs are exceedingly high, lowering them, up to a point, is a good policy option because it facilitates some transfer of land from less efficient to more efficient farmers and results in welfare improvements, especially for small-holder farm households. Similarly, with very high transaction costs, even if small-holder farmers hold wrong wage beliefs, a moderate reduction of transaction costs is a good policy move because transaction costs will still remain high enough to prevent farmers from selling significantly more land than they would have to in a first best equilibrium scenario. On the contrary, with the wrong wage belief and very low levels of transaction costs, small-holder farmers are likely to lease a lot more land than they should in a first best equilibrium scenario. This, while also flooding the labour market with their mostly unskilled labour, additionally depresses off-farm wage rates even further, a move that has a negative effect on welfare. As our model demonstrates, this leads to an inefficient outcome for small-holder farmers and results in an overall reduction in their welfare.

Household welfare implications based on the poverty module

Table 4.1 summarizes the results obtained from our microsimulation module. Here, we examine the effect of land transfer on levels of poverty and inequality at the household level. The stats quo, depicted by the reference indicators in 4.1, is calculated using the international poverty line. It suggests that even though 40.73% of the survey population live below the poverty line, poverty is more prevalent in rural than urban areas. Specifically, 57.40% of the poor reside in rural areas, as opposed to only 19.19% who live in urban areas. However, the opposite is true for levels of inequality which is more pronounced in urban areas (35.29%) than in rural areas (26.87 %).

With regards to the effects of transaction costs on levels of poverty and inequality, results from our base scenario indicate that higher levels of transaction costs increase poverty headcount and levels of inequality at both the national level and across all households. When the baseline results are compared to the reference period, at the national level, the population of people living below the poverty line increase by 2.55%. As expected, increases in land transfers from small-holder farmers to large-scale farmers that results from higher levels of transaction costs have a higher effect on poverty headcount in rural areas (3.5%) than in urban areas (1.33%) where little or no land exchange takes place. Increases in food prices by an average of 3.4%, coupled with the decline in both rural and urban household income, explains the spike in the level of poverty. With respect to poverty head count, the effect is more pronounced in the rural area because, at 1.5 %, they experience a steeper decline in income levels than their urban counterparts where income levels decline by only 0.009 %. Similarly, since expenditure on food is the main component of poor households' spending, increases in food prices disproportionately affect rural households where poverty levels are more prevalent.

The rise in food prices can be explained by increases in the amount of land transferred by small-holder farmers to their large-scale counterparts. Our simulation results, presented in 4.2, show that, at lower levels of transaction costs, small-holder farmers transfer an average of up to 91,000 hectares of land to large-scale farmers over the 10 year simulation period. These transfers reduce the food production capacity of small-holder farmers, thereby putting upward pressure on food prices. Simultaneously, in the face of rising food prices, income levels of rural households decreases by 0.47% primarily because of decreasing on and off-farm wage rates. The end result is an increase in the level of poverty.

The effects of transactions costs on poverty are even more prominent when we account for the difference in labour productivity between large-scale farmers and small-holder farmers. This is done by comparing the base scenario to simulation one. The results, shown in table 4.1, demonstrate that both national and rural poverty headcount triples from 2.55% to 9.24% and 3.50% to 11.49% respectively. The effects are starker in urban areas where it quadruples from 1.33% to 6.32%.

Similarly, the effect of land transfers on poverty levels can be attributed to the steeper increase in food prices from 3.4% in the baseline to 17.69% in the first scenario. This again is principally because small-holder farmers transfer an even higher percentage of their land holdings to large-scale farmers when differences in labour productivity are halved. As shown in figure 4.2, when transaction costs are very low, land traded by small-holder farmers increase from 313,000 hectares in our base scenario to 621,000 hectares in simulation one. The increase in land transfers could be explained by two reasons. First, land prices increase from 6.97% to 14.81% , thereby leading to an increase in land revenue from 3.58% in the baseline to 7.18% in simulation one. This encourages small-holders to transfer more land to large-scale farmers. Additionally, halving labour productivity differences between the two farming sectors implies that levels of productivity of small-holder farmers increases relatively to that of large-scale farmers. As a result, small-holder farmers attempt to substitute labour, the less expensive factor of production, for land. This motivates small-holder farming households to lease more land to large-scale farmers and use more labour as a substitute. The resulting effect is that food prices increases by 17% , whereas levels of income either reduce by 0.86% in the case of rural households or remain largely unchanged in the case of urban households (0.004%). Hence, the magnitude of the increase in poverty levels will be larger in simulation one than in the base scenario.

On the contrary, when we account for the differences in land use efficiency by comparing our base scenario to simulation two, results show that levels of poverty actually reduce by 0.17% at both the national and rural levels, and 0.18% in urban areas. Levels of inequality also minimally fall at all levels. Closing the land use efficiency gap between the two farming sectors from a factor of 5 to 3 implies that the land use efficiency of small-holder farmers relatively increase. When this happens, small-holder farmers are less likely to transfer land to large-scale farmers. Consequently, even when transaction costs are very low, they only transfer 38,000 hectares compared to 313,000 hectares in the base scenario. The rest of their land holdings are used to increase local food production and hence reduce food prices. Thus, in this

scenario, while income levels falls by only 0.19% in rural households and increases by 0.04% in urban households, food prices decrease by 0.68 %. Since the magnitude of the decrease in food prices are higher than the reduction in household income, both poverty headcount and levels of inequality fall.

Table 4.1: Poverty results

Deviation of rates of poverty and inequality from reference indicators (2018) (%)				
	Reference Indicators (2018)	*Baseline Scenario*	*Simulation 1*	*Simulation 2*
Poverty Head count				
National	40,73	2,55	9,24	-0,17
Rural	57,40	3,50	11,49	-0,17
Urban	19,19	1,33	6,32	-0,18
Gini index				
National	35,69	0,40	1,21	-0,01
Rural	26,87	0,08	0,42	-0,02
Urban	35,29	0,12	0,62	-0,03

Macro-economic effects of changes in transaction costs

The results, as presented in table 4.2, indicate that reduction in transaction costs have a considerable impact on the Sierra Leone economy. Over our 10-year simulation period, a reduction in transaction costs lead to an annual average GDP growth rate of 1.2% in our base year, 2.25 % in scenario one and 0.15% in scenario two. As expected, the most pronounced effects are experienced in the large-scale crop sector where an expansion of 18.97 % is recorded in the base year, 36.75 % in scenario one, and 2.32% in scenario two. Scenario one records the highest expansion because more land is transferred in this simulation for reasons explained in the preceding sections. The opposite is true for scenario two. Since the land holdings of small-holder farmers decrease as transaction costs decline, the small-scale farming sector also shrinks in all three scenarios depending on the amount of land transferred to large-scale farmers. Nonetheless, the net effect is an expansion of economic activities in the country because of two reasons. First, the small-holder farming sector makes up 32% of the GDP share in the economy. Thus, a reduction in economic activities in the sector will have a profound economy-wide impact on output levels. Secondly, since the growth experienced in the large-scale farming sector is proportionately larger than

the decline experienced in the small-scale farming sector, the overall results would be an expansion of economic activities in the country.

Furthermore, it should be noted that depending on the extent to which a sector uses off-farm labour in its production activities, changes in transaction costs have differentiated effects across the various sectors of the economy. As transaction costs decline, sectors that intensively use off-farm labour tend to benefit from this shock through a reduction in their wage expenditure, and by extension their production cost. Thus, as illustrated in the lower section of table 4.2, in all three scenarios, as transaction costs and off-farm wages decline, the increase in the average demand for labour is more pronounced in the trade sector, and to some extent, the mining sector. This is because both sectors in the country are largely informal and unskilled (Statistics Sierra Leone, 2016b), and therefore do not impose any additional skills requirement to absorb the mostly unskilled labour from the crop farming sector that becomes available after land is transferred to the large-scale farm sector. The result is an increase in the value addition in those sector in all three scenarios.

However, for the other sectors, namely Livestock, Industry and Private services, lower rates of transaction costs result in a slightly negative value addition because the intermediate goods offered by these sectors are directly affected by these shocks. Principally, since the price effect, discussed in section 4.4.3, lead to a fall in the welfare of small-holder farmers, lowering transaction costs lead to a fall in demand for these intermediate goods. Consequently, the value added in these sectors will be slightly negative at lower levels of transaction costs.

Table 4.2: Sectoral Growth Results

Average annual growth rate (2018 -2028) (%)				
	GDP Share (2015)	**Base**	**Sim 1**	**Sim 2**
GDP	100	1,20	2,25	0,15
Crop_LHF	0,05	18,97	36,75	2,32
Crop_SHF	0,32	-2,69	-5,35	-0,32
Livestock	0,04	0,02	-0,08	0,01
Forestry	0,05	0,00	0,00	0,00
Fishery	0,06	0,00	0,00	0,00
Mining	0,10	0,14	0,29	0,02
Industry	0,03	0,12	-0,03	0,04
Trade	0,09	1,02	1,86	0,13
Govt Services	0,16	0,09	0,28	0,00
Private Services	0,10	0,15	0,10	0,04

Average annual Labour demand (2018 -2028) (%)			
	Base	**Sim 1**	**Sim 2**
Crop_LHF	-24,95	-41,44	-3,73
Crop_SHF	-2,69	-5,35	-0,32
Livestock	0,06	-0,22	0,04
Forestry	0,67	0,75	0,13
Fishery	0,75	0,94	0,14
Mining	0,72	1,46	0,09
Industry	0,19	-0,05	0,06
Trade	7,82	14,62	1,00
Govt Services	0,10	0,30	0,00
Private Services	0,16	0,10	0,04

4.5 Conclusion

Large-scale transfer of land from small-holder farmers to their large-scale counterparts is already underway in Sierra Leone and much of Sub-Saharan Africa and is likely to be a mainstay in the agricultural sector for the foreseeable future. Proponents have presented this phenomenon as an opportunity to transform the agricultural sector in the global South from its current subsistence and traditional form to a more mechanized and industrialized model that will contribute to improving productivity levels and raise income levels of the rural poor, most of whose livelihoods are tied to the fortunes of the agricultural sector. Although there is an ever growing literature on the large-scale transfer of land from small-holder farmers to large-scale investors, less attention has been given to the extent to which factor market imperfections affect these transfers and their welfare effects both at the household and national levels. The latter is a major weakness particularly so when much of the policy debates about large-scale land acquisition have centred around their poverty reduction potential. This paper attempts to fill this gap and focuses on examining the economy-wide impact of land and labour market imperfection and the resulting transaction costs on land transfers and their welfare implications.

In this chapter, we employed an integrated computational modelling framework that combines a land and labour market model, a CGE model and a micro simulation poverty module. We started by first measuring the impact of different levels of transaction costs on land transfers and labour demand and supply in Sierra Leone's land market through the land and labour market module. These first level results are introduced into a Sierra Leone CGE model, and based on these results, the CGE model estimates the economy-wide effects of the different levels of transaction costs on growth levels of GDP and value added across the different sectors in the country's economy. The results from the CGE model are then fed into the microsimulation model to measure the welfare effects of these land transfers on different households in the country. Our CGE modelling framework is based on the EXTER model and is calibrated using a Social Accounting Matrix for Sierra Leone. Also, the microsimulation model is constructed using Sierra Leone's 2018 demographic and household survey (Statistics Sierra Leone, 2018).

From a policy perspective, our analysis provides insights into some of the important aspects that continue to inhibit investments, productivity and efficiency of the agricultural sector in most agrarian societies in SSA. Large-scale land acquisition inevitably leads to sectoral changes because of competition for both land and labour,

two of the most important factors of production. Our computational modelling results suggest that various levels of land and labour productivity triggers different responses to the reduction of transaction costs in land markets. Higher levels of labour productivity are likely to result in more land transfers than higher levels of land use efficiency. Furthermore, our results suggest that moderately reducing transaction costs through reforming land laws and customary land governance practices in Sierra Leone's land market could considerable enhance economic growth and welfare of its small-holder farmers. To this end, the reform of certain institutional arrangements such as restrictions on foreign ownership of land and the unwritten nature of customary practice that could reduce transaction costs should be considered.

However, our results also indicate that careful attention should be paid to the extent to which transaction costs are reduced if information about the responsiveness of off-farm wage rate to the reduction of transaction costs are not properly understood by policy makers and communicated to small-holder farmers and other land holders. If small-holder farmers and other stakeholders continue to hold the erroneous belief that a considerably better wage rate can be earned from engaging in off farming activities, then substantially eliminating transaction costs will have the opposite effect on welfare. Our results thus show that such a biased belief could lure farmers into trading a substantial part of their land holdings, render them dependent on local markets for their food needs, while simultaneously depressing off-farm wages to reduce their disposable income even further. This reduction in their disposable income will coincide with an increase in their demand for food products in local markets, forcing prices to increase.

Additionally, given the importance of the efficiency level of small-holder farmers and large-scale investors in our model, it should be noted that some of the issues raised by civil society organisations in Sierra Leone and elsewhere (Oxfam, 2011; Green Scenery, 2011) should not be dismissed or ignored. An institutional arrangement where large-scale investors acquire the most productive land from small-holder farmers, and adopt capital intensive production technologies only to export most of their outputs out of the country will not have the desired effects on economic growth, food security and poverty reduction in the country. Thus, the overall effect of such a policy option will depend on creating the enabling environments for large-scale land investors to thrive along side small-holder farmers. This could happen through various channels like contract farming, so as to encourage the transfer of technical farming skills and other technological inputs from large-scale investors to small-holder farmers.

While our model attempts to address an existing gap in the literature, there are several areas of future research on this subject matter. In our model, no consideration is given to the use of other local resources like water by large-scale land investors and the effects it would have on the productivity and welfare of small-holder farmers and other community members. Additionally, our model does not account for spill over effects that might arise from knowledge transfers, construction of local infrastructures like roads and schools by large-scale land investors in their operations area. Finally, the significance of unused and fallow land, particularly in a country like Sierra Leone where slash and burn are the main source of land conversion, should be considered in the context of land availability for acquisition by large-scale investors. For instance, a study carried out by the German Ministry of Economic Development in Sierra Leone concluded that Sierra Leone is presently over cropped and that the present conversion method of slash and burn does not allow for a sufficient time frame for the soil fertility and vegetation to sufficiently recover (Bald and Schröder, 2012). More efficient and environmentally friendly modes of land conversion could substantially increase the amount of land available for acquisition and reduce the amount of competition for land between small-holder farmers and large-scale investors.

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Chapter 5

Land Grabbing in Sierra Leone: Government Capture or a Mismatch of Beliefs?

Edmond Augustine Kanu, Christian H. C. A. Henning

Abstract This paper examines the effects of transaction costs, policy beliefs and political incentives on the welfare of small farming households and urban consumers and the profits of large-scale farmers. Specifically, an extended Farm Household Model (FHM) is used to estimate the welfare effects of transaction costs on farm households and the profit of large-scale farmers, while a Bayesian estimation technique and the Baron-Ferejohn legislative bargaining model are used to ascertain whether political performance gaps are as a result of biased incentives or policy beliefs. Overall, our results demonstrate that there is an inverse u-shaped relationship between marginal transaction costs and welfare of small-scale farmers. In this context, high marginal transaction costs might function as a coordination device impeding farm households from realizing inefficient rational expectation equilibrium. Accordingly, reducing marginal transaction costs on land markets might have overall negative welfare effects on small-scale farmers. Regarding the role of policy beliefs and incentives in the choice of land grabbing policies, our main results indicate that even though some stakeholders are captured by large-scale farmers, i.e. they put an extremely high political weight on large-scale farm profits, their choices of land market policies are not driven by land grabber preferences. More importantly, land market policies would be only significantly inefficient if small-scale farmers would hold irrational expectation beliefs.

Keywords: Land grabbing, transaction costs, policy networks and policy beliefs

JEL Codes: Q15, C54, D83.

5.1 Introduction

In response to increasing food and fuel prices in the 2000s and the resulting search for alternative food and energy sources, many in the developed world turned to invest in large tracts of agricultural land to cultivate both food as well as energy crops for bio-fuel production (Borras and Franco, 2013; Daniel and Mittal, 2009; De Schutter, 2015; German *et al.*, 2013). While these investments are dotted all around the globe, most have been situated in Sub-Saharan Africa (SSA) where there have been questionable claims of the existence of a large amount of idle land (Anseeuw *et al.*, 2011). Globally, Byerlee and Deininger (2011) estimate that between October 2008 and August 2010, two-third of the 46.6 million hectares of the globally acquired land were in Sub-Sahara Africa. The sheer scale and speed of these acquisitions, some at the expense of displacement and expulsion of local land users, raised some concerns among international development organisations like the World Bank, the International monetary Funds(IMF), and the Food and Agricultural organisation of the United Nations (FAO), the media and numerous civil society organisations (Anseeuw, 2013; Borras and Franco, 2012; De Schutter, 2015; Edelman, 2013).

Governments of some of the host countries have been at the forefront of promoting the large-scale acquisition of agricultural land. In some cases, they have established regulatory bodies to liaise with foreign players and facilitated the acquisitions process (Tzouvala, 2019; Woertz, 2013; Lavers, 2012). In other instances, they have suggested and embarked on reform of land policies and other regulations to make land transfers seamless and less cumbersome (Wolford *et al.*, 2013; Bujko *et al.*, 2014; Krieger and Leroch, 2016; Food and Agricultural Organisation, 2009; German *et al.*, 2013; Stephens, 2013). The United Nations Conference on Trade and Development (UNCTAD) estimates that 87% of government-established investment promotion agencies have been at the forefront of promoting and facilitating large-scale investments in SSA, more than anywhere else in the world (UNCTAD, 2009). International development agencies and financial institutions like the World Bank, the Food and Agricultural Organisations (FAO), the International Food Policy Research Institute (IFPRI) have also glowingly endorsed these investments opportunities and suggested that if properly managed and regulated, large-scale land acquisition could serve as a vehicle for rural development and help provide the much-needed investment to a mostly neglected agricultural sector (Food and Agriculture Organization, 2016; von Braun and Meinzen-Dick, 2009; Food and Agricultural Organisation, 2009; Byerlee and Deininger, 2011). This, it is argued, would contribute to productivity improve-

ments and reducing poverty particularly in rural areas in Sub-Saharan Africa (SSA) (Ali *et al.*, 2016; Sipangule and Lay, 2015).

The term "land grabbing" has been frequently used by some actors to describe this new wave of large-scale acquisition primarily because it is regarded as negatively affecting the livelihoods of poor farmers as a result of the potential risk of displacement of local small-holder farmers, loss of grazing land for pastoralists, loss of income for local communities, and biodiversity losses, among others (Anseeuw *et al.*, 2012; De Schutter, 2011; Hallam, 2011). Daniel and Mittal (2009) define "land grab" as the "purchase or lease of vast tracts of land by wealthier, food-insecure nations and private investors from mostly poor, developing countries to produce crops for export". As Borras and Franco (2013) would later observe, the term "land grabbing" portrays an unequal power relation where one party, the small-holder farmers, are treated unfairly and unjustly. As a result, the term has become synonymous with the acquisition of huge tracts of land leading to the displacement and expulsion of people from their land with little or no consideration for the impact it will have on their livelihoods[1] .

Previous studies on the subject matter of large-scale land acquisition focused on its sheer scale and size (Anseeuw *et al.*, 2012; Oya, 2013), its human rights implications (Edelman, 2013; Künnemann and Monsalve Suárez, 2013a; Wisborg, 2013), and in some instances, its effects on the displacement of farmers and food prices (Agbley, 2019; Lay *et al.*, 2018; Corsi *et al.*, 2017; Cramb *et al.*, 2017; Mann and Bonanomi, 2017; Baglioni and Gibbon, 2013). Lately, while there have been significant strides in the literature examining the economic impacts of large-scale land acquisition on levels of poverty, income and food security (Baumgartner *et al.*, 2015; Kleemann and Thiele, 2015; Lisk, 2013; Sipangule and Lay, 2015), political economy analyses have rarely been provided. Given the important role political institutions play in the choice and implementation of agricultural and land policies, a purely welfare-centric and economic approach to analysing land grabbing is clearly inadequate to understand the factors that determine the choice of these policies. From a political economy perspective, an examination of whether political agents prefer large-scale land acquisition policies because they believe it results in technical progress and growth in the economy, or because they are captured by particular interest groups of foreign investors or local large-scale farmers is missing.

[1]This study also adopts the interchangeably usage of the terms large-scale land acquisition and land grabbing.

Furthermore, although there is a consensus in the literature that policy processes that result in the choice of large-scale land acquisition processes are complex and involves multiple actors with different end goals, expertise and incentives (Borras *et al.*, 2011; Anseeuw *et al.*, 2013; German *et al.*, 2013; Yengoh *et al.*, 2016) majority of the studies that have attempted to evaluate these processes fail to consider these complexities (Aabø and Kring, 2012; Baumann, 2013; Scurrah *et al.*, 2015). To illustrate an example of one layer of the complexity inherent in the large-scale land acquisition policy process, take the case of say a government official and a local small-holder farmer association. Both might have a policy preference of reducing poverty and increasing agricultural productivity of rural farm-households. However, they might hold different beliefs about how their preferences can be achieved. The former might believe that the best way to achieve higher agricultural productivity, and by extension reduce poverty, will be by transferring agricultural land to supposedly more efficient large-scale farmers who can then pass on modern farming techniques to the latter by employing them on their farms. Small-holder farmers' associations, on the other hand, might believe that the best way to increase agricultural productivity and reduce poverty would be by increasing support and extension services to small-holder farmers through increasing government investment in the agricultural sector and not necessarily through the transfer of land to large-scale farmer. In such circumstances, even though they have similar policy preferences and incentives, both might be in favour of, or against, large-scale land acquisition because of different beliefs about how policies translate into outcomes.

In relation to political economy perspectives, while the emerging land grabbing literature has given very little consideration to the role of policy beliefs in the choice of large-scale land acquisition policies (Hall, 2004; Krieger and Leroch, 2016; Lavers, 2012), previous studies of agricultural-related policy processes have illustrated the importance of policy beliefs and policy incentives in the choice of certain policy options (see e.g. Krueger *et al.*, 1991; Bischoff and Siemers., 2011; Walstad, 1996). Caplan (2001, 2007), for instance, demonstrate that because of the complex relationship between policy goals and their implied political outcomes, policy makers rely on naive mental models, also known as policy beliefs, to simplify these complexities. Henning *et al.* (2019) found that informational exchanges among politicians, legislators, policy experts and international donor organisations proved to be a strong policy influence mechanism in the Comprehensive African Agricultural Development Program (CAADAP) in Sub-Saharan Africa. Policy beliefs, as introduced by Henning *et al.* (2018a), are policy makers' subjective prior probabilities about how policies translate into outcomes. They are analogous to the interpretations and

assumptions actors hold about how policies will affect society and drive policy preferences of political agents. As Caplan (2001, 2007) suggests, the reliance on policy beliefs is rooted in the absence of the technical knowledge of how policies translate into outcomes and they are seen as one of the main determinants of the choice of suboptimal policies.

Despite increasing evidence that demonstrates the importance of policy incentives and policy beliefs in the choice of policies, the growing literature on the political economy of large-scale land acquisition virtually ignore their role in the analysis of the large-scale land acquisition policy process. Rather, in most of studies on this topic so far, it is assumed that politicians have a perfect knowledge about how land grabbing policies translate into outcomes (Krieger and Leroch, 2016; Lavers, 2012; Chakravorty, 2016). In this paper, through a comprehensive political economy analysis of the large-scale land acquisition policy processes, we attempt to incorporate the role of policy beliefs and incentives in the choice of land grabbing policies. At a methodological level, we develop an extended Farm Household Model (FHM) to analyze the effects of land market policies on small-scale family farms in the presence of labour and land market imperfections. Our theoretical framework is based on the logic of a simultaneous political economy equilibrium proposed by Binswanger and Deininger. (1997). This framework allows for the examination of the economic, political and institutional factors that shape agricultural policy processes like large-scale land acquisition.

The main focus of our study is Sierra Leone, one of the countries where land-grabbing has been prevalent since 2009 (The Land Matrix Global Observatory, 2013). Like in most other regions of the world, the precise amount of land leased in the country is unknown. While the Oakland Institute estimates that around 500,000 hectares of land have been leased nationwide (Oakland Institute, 2011), Christian Aid reports that an estimated 1,154,777 hectares of land– about one-fifth of the country's agricultural land- has been leased out to various national and multinational corporations (Baxter and Schaefter, 2013). Land acquisitions so far recorded has mostly been for oil palm plantations and sugarcane plantation for ethanol production, with the sector predominantly dominated by very few foreign companies in the country (Millar, 2015; Fielding *et al.*, 2015; Bottazzi *et al.*, 2018; Yengoh *et al.*, 2016). The magnitude of land holdings in the country must be put into context. This is because in addition to the fact that Sierra Leone is one of the smallest countries in West Africa, with a land mass of just 72,000 square kilometres and a total land area of only 5.4 million hectares of arable land, up to 120,000 hectares of land are also

already held by the largest mining companies in the country (Gboku *et al.*, 2017; Green Scenery, 2011).

Our study makes three important contributions to the land grabbing literature. First, it provides empirical insights into the importance of policy beliefs and policy incentives in the choice of specific land policies. Rather than assuming perfect rationality of political choices that results in the choice of large grabbing policies, to the best of our knowledge, this is the first attempt to empirically estimate the impact of political beliefs and incentives on the choice of these policies. Second, our paper quantifies the effects of transaction costs in land markets on the welfare of different socio-economic groups based on the policy beliefs and political incentives of stakeholders and farm households. Given that a majority of households in Sierra Leone live in rural areas and are employed in the agricultural sector (Statistics Sierra Leone, 2018), changes in land holdings could have significant welfare implications at both the local and national levels. Thus, an empirical examination of the welfare effects of land transfers under various policy belief scenarios could guide future policy decisions of stakeholders. Third, through a political diagnosis analysis, we empirically identify why land grabbing policies have failed to achieve their desired objectives (political performance gaps).

The rest of this paper is structured as follows: following this introductory section, the next section presents the empirical background and data used in the analysis. In section 3, we present our theoretical framework and methodological strategy, while in Section 4, our results are presented and discussed. We conclude with a summary in section 5.

5.2 Theoretical Framework

5.2.1 Modelling Land and Labour Market Decisions of Small-Scale Farmers Under Imperfect Market Conditions

We develop an extended farm household model (FHM) to analyze the effects of land market policies on small-scale family farms in the presence of labour and land market imperfections. The model covers perfect, imperfect, and totally missing labour markets (Henning and Henningsen, 2007). The farm household is assumed to maximize utility subject to technology, time, and budget constraint. Accordingly, farm households solve the following maximization problem:

$$\max_{x,c} U(c) \tag{5.1}$$

subject to

$$\begin{aligned}
G(x,r) &= 0 \qquad \text{(production function)} && (5.2)\\
T_L - |X_L| + X_L^h - X_L^s - C_L &\geq 0 \qquad \text{(time constraint)} && (5.3)\\
P_m C_m + P_a C_a &\leq \Big\{ \Big[P_c X_c + P_a (X_a - C_a) \Big] && (5.4)\\
&\quad + P_a C_a - P_v |X_v| - g^L(X_L^h) \\
&\quad + f^L(X_L^s) + E \Big\} \qquad \text{(budget constraint)}
\end{aligned}$$

where $U(c)$ is the farm household's utility function, which is assumed to be monotonically increasing and strictly concave, and c is a vector of consumption goods consisting of market commodities (C_m), self-produced agricultural goods (C_a), and leisure (C_L). Production technology is represented by a well-behaved multi-input, multi-output production function present in equation 5.2 (Lau, 1978), where x is a vector of production goods, expressed as outputs, and r is a vector of quasi-fixed factors. The farm household produces pure market goods ($X_c > 0$) and goods that are partly consumed by the household ($X_a > 0$). It uses variable intermediate inputs ($X_v < 0$), labour ($X_L < 0$), and the quasi-fixed factors land (R_g) and capital (R_k). The farm household faces a time constraint represented in equation 5.3, where T_L denotes the total time available. $|X_L| = X_L^f + X_L^h$ is the total of on-farm labour time subdivided into family labour (X_L^f) and hired labour (X_L^h), and X_L^s denotes off-farm family labour. There are four possible regimes of labour market participation. First, the household simultaneously sells family labour and hires labour. Second, farmers

neither sell nor hire labour (autarky).Third, households only sell off-farm labour and fourth, they only hire on-farm labour.

To simplify the analysis, we focus on labour market in the third regime, i.e. small-scale farm-households partly supply off-farm work but do not hire external on-farm work. The budget constraint in equation 5.4 states that a household's 'tax-corrected' consumption expenditures (left-hand side) must not exceed its 'tax-corrected' monetary income (right-hand side). The household may receive income from farming and off-farm employment. In addition, it receives ($E > 0$) or pays ($E < 0$) transfers, which are determined exogenously. As will be explained in more detail below, partly exogenous transfers correspond to payments or receptions from long-term land market contracts. Here, P_i, $i \in \{m, a, c, v\}$ denotes an exogenous consumer and producer price.

A special emphasis is given to the modelling of labour markets, because it is well recognized that rural labour markets are often plagued by market imperfections. Non-proportional variable transaction costs (NTC), as well as observed heterogeneity of labour, result in a non-linear labour income function for off-farm labour supply (f) and a non-linear labour cost function for hired on-farm labour (g) (Henning and Henningsen, 2007). With no heterogeneity and no NTC, (f) is linear. In this case, once households participate in the off-farm labour market, marginal off-farm income is equal to the exogenously given wage rate corrected for proportional transaction costs (PTC) as well as for household-specific wage shifters. Thus, if households participate in the off-farm labour markets, the farm household model becomes separable and delivers standard microeconomic comparative static results (Sadoulet *et al.*, 1998). Of course, if fixed or proportional transaction costs are too high, households may still abstain from the labour market and stay autarkic.

In contrast, when labour markets are imperfectly competitive due to heterogeneity or NTC, both functions are non-linear. In this case, the internal shadow price of labour P_L^* is endogenously determined. Hence, the non-separability of the FHM occurs even when households participate in labour markets. Theoretically, the curvature properties of the labour revenue function f and the labour cost function g are ambiguous. For analytical convenience, we assume f to be concave, since a non-concave labour revenue function makes the FHM approach less tractable. As fixed transaction costs (FTC) create discontinuities in the f and g functions, solutions to the maximization problem in equations 5.8 and 5.4 cannot be found by simply solving the first-order conditions. Thus, for simplicity, we assume farm-households

stay in regime 3. [2]

Assuming an interior solution for the labour market regime 3, the optimal quantities of consumption and production goods and the allocation of time are determined by conditions 5.2 to 5.4 and the following equations

$$\frac{\partial U(.)}{\partial C_i} - \lambda P_i^{c*} = 0 \quad i \in \{m, a, L\} \tag{5.5}$$

$$\phi \frac{\partial G(.)}{\partial X_i} + \lambda P_i^{p*} = 0 \quad i \in \{c, a, v, L\} \tag{5.6}$$

$$\frac{\partial f(.)}{\partial X_L^s} = P_L^* \tag{5.7}$$

where $C_m, C_a, C_L, X_c, X_a > 0$, $X_L, X_v < 0$, and $X_L^s > 0$. $\lambda, \phi > 0$ are Lagrangian multipliers associated with the budget and the technology constraints, respectively. $P_L^* = \mu/\lambda$ denotes the unobservable internal shadow wage in the case of non-separability, where $\mu > 0$ is the Lagrangian multiplier associated with the time constraint.

In the separable model, P_L^* corresponds to the exogenous wage rate corrected for PTC and individual wage shifters. Moreover, we introduce decision prices P_j^{c*} and P_j^{p*} for consumer and producer goods, respectively. Decision prices of labour and leisure differ between the separable and non-separable FHM. For the non-separable model, these prices are equal to the internal wage rate $P_L^{p*} = P_L^{c*} = P_L^*$. As for the separable model farm households either supply or demand labour, the decision prices of labour and leisure are exogenously given by the off-farm wage in the first case $P_L^{p*} = P_L^{c*} = P_L^s$.

5.2.2 Modelling Land Market Decisions of Farm Households (FH)

So far, we have considered a static farm-household equilibrium. However, Farm Households (FH) have to make dynamic decisions, i.e invest in capital and land. Since our focus is on land market decision, we model land markets by assuming that FH can make long-term land lease arrangements. Formally, we assume that farm households own a number of B^s hectares of land. Furthermore, we assume two

[2] More generally, one could follow (Key *et al.*, 2000) and decompose the solution into two steps. First, solving for the optimal solution conditional on the labour market participation regime, and then choose the regime that leads to the highest level of utility.

periods. In the first-period, FH can agree on long-term land arrangements, where they can rent or lease land. Let R^s denote the amount of land a farmer leases, while R^h denotes the amount a farmer rents on the land market. Again, to model imperfect land markets, let $g^B(R_B^h)$ denote total cost implied by renting the amount of R_B^h land, while $h^B(R_B^s)$ denotes total revenues received from leasing the amount of R_B^s land.

As for labour markets, the functions g^B and f^B incorporate potential non-linear transaction costs and heterogeneity of land. We assume farmers are myoptic when making their land market decisions. In particular, let $\tilde{p}_i$ denote consumer and producer good prices expected by the FH when making labour market decisions, then optimal land market decision result from expected profit maximization. Accordingly, farm households solve the following maximization problem:

$$\max_{R^s,R^h,R_B} \Pi(\tilde{p}, R_B) + f^B(R_b^s) - g^B(R_B^h) \tag{5.8}$$

subject to

$$B_s + R_B^h - R_B^s = 0 \qquad \text{(Land constraint)} \tag{5.9}$$

Following Henning and Henningsen (2007), we assume the following functional forms for land lease revenues and land rent cost functions, respectively:

$$f^B(R_b^s) = P_B R_B^s - TC^s(R_B^s) \tag{5.10}$$

$$g^B(R_b^h) = P_B R_B^h + TC^h(R_B^h) \tag{5.11}$$

where TC^s and TC^h are transaction costs of leasing or renting land, respectively, imposed on the FH, and P_B denotes the land market price.

To simplify our analysis, we assume that total land owned by small-scale farmers, B_s, equals the total amount of land available. Therefore, small-scale farms are net-supplier of land on the land market. That is, they do not rent land. Consequently, net-supply result from the following FOCs:

$$\frac{\partial \Pi}{\partial R_B} - P_B + \frac{\partial TC^s}{\partial R_B^s} = 0 \tag{5.12}$$

Thus, the land supply of small-scale FH is a function of land market price, P_B, transaction costs, and FH's beliefs about future prices, $\tilde{p}$. Hence, we define $\tilde{P}_B$ as the shadow price of land $\tilde{P}_B = P_B - mTC^s(R^s_B)$, where mTC^s denote marginal transaction cost, which implies that land net-supply is a function of the shadow price of land and expected input and output prices as shown below:

$$R^s_B = R^s(\hat{P}_B, \tilde{p})$$

In contrast to the small-scale farms, we assume that large-scale farms observe no transaction costs, since by our simplified assumption, large-scale farms do not own land. Hence, net-land market demand of large-scale farms results from the following profit maximization equation:

$$\frac{\partial \Pi^l c}{\partial R^{lc}_B} - P_B = 0$$

Where

$\Pi^l c =$ Profit function of large-scale farms

$R^{lc}_B =$ The amount of land used for large-scale farm production

It should be noted that the land demanded by large-scale farmers depends on both the expected input and output prices. Let $\tilde{p}^{lc}$ denote the expected prices of large scale-farms. Thus, it follows that the amount of land used by large-scale farmers will be a function of both the expected prices of large-scale farms and the land market price as shown in 5.13 below:

$$R^h_{lc,B} = R^h_{lc,B}(\tilde{p}^{lc}, P_B) \tag{5.13}$$

5.2.3 Macro Economic Equilibrium

At the macro level, we assume a simply Walras equilibrium for both the land market at the first stage and the induced general equilibrium of the economy at the second stage. In particular, the equilibrium land market price, P_B^* and corresponding equilibrium shadow land price of FH, $\bar{P}_B$, are determined by the following market equilibrium condition:

$$R_h^s(\hat{P}_B^*, \tilde{p}) - R_{lc,B}^h(\tilde{p}^{lc}, P_B^*) \equiv 0 \tag{5.14}$$

$$\tilde{P}_B^* = P_B^* - mTC^s(R_B^s(\hat{P}_B^*, \tilde{p})), \tag{5.15}$$

where we assume that both small and large-scale farms behave as price takers. Moreover, the land demand of large-scale farms is derived from classical profit maximization function as defined in the equation above. In the second period, general economic equilibrium is realized.

To keep the analysis simple, we assume that the economy comprises of three sectors; the small-scale and large-scale farm sector, denoted as sc and ls respectively, as well as a non-agricultural sector, denoted by na. Let $k \in \{sc, lc, na\}$ denote the index of a production sector, while production technology of a sector k is represented by a restricted profit function, $\Pi^k(p_k, R_k)$. p_k denote the prices of relevant outputs and R_k, the relevant quasi-fix inputs of a sector k.

Furthermore, the economy is assumed to comprise of two households: an urban and a rural household. Let $h \in \{u, r\}$ denote the index of a household, where $h = r$ and $h = u$ represent a rural and urban household respectively. Rural households correspond to small-scale farm-households, i.e. the rural household owns all quasi-fix inputs of the small-scale-sector and provides total on-farm labour as well as total off-farm labour of FH. Urban household, on the other hand, own all quasi-fix inputs of the large-scale farm sector as well as of the non-agricultural sector. It also provides total labour employed in the non-agricultural, while the large-scale farm sector, net of off-farm labour, is supplied by rural households.

Let $p*$ be the vector of equilibrium prices, while p_c^* denotes the vector of consumer good prices, and p_p^* the subset of producer good prices. For simplicity, we assume that small-scale farm sector produces only self-consumed food commodity a, while the large-scale sector only produces the agricultural export good, c. The

non-agricultural sector produces the consumer good m as well as the general intermediate input v. Beyond intermediate input v, labour is the only variable input. In particular, we distinguish small-scale-farm labour, $X_{L,sc}$ from labour input into all other sectors, $X_{L,k}, k \in P\{c\}$.

Urban and rural households derive utility function from consumption of food (a), agricultural export goods (c) as well as from non-agricultural (m) and leisure (L) consumption. Households utility is represented by the quasi-concave utility function $U_h(c^h)$, where $c^h = \{C_a^h, C^h, C_m^h, C_L^h\}$ denote the consumer good bundle of household h. Additionally, we assume that the country is sufficiently small that the agricultural export, c, the consumer good, m as well as the intermediate inputs, v can be traded on the world market prices for externally fixed world market prices, pw_i. This implies that domestic equilibrium prices for these goods equal the following corresponding world market prices:

$$P_i^* = PW_i \quad i \in \{m, c, v\} \tag{5.16}$$

Further, we define p_h^* as a vector of equilibrium decision prices for consumer goods consumed by household h, while we define p_k^* as the vector of decision prices for outputs relevant for the production of production sector k. Moreover, we define $r_k = \left\{R_k^B, R_k^C\right\}$ as the vector of the amounts of the quasi-fixed factors land and capital, respectively, endowed by sector k. Accordingly, our micro models are represented below:

$$\begin{aligned}
p_r^* &= \left\{P_a^*, P_c^*, P_m^*, \bar{P}_L^*\right\} \\
p_u^* &= \{P_a^*, P_c^*, P_m^*, P_L^*\} \\
p_a^* &= \left\{P_a^*, P_c^*, P_v^*, \bar{P}_L^*\right\} \\
p_c^* &= \{P_c^*, P_v^*, P_L^*\} \\
p_m^* &= \{P_m^*, P_v^*, P_L^*\}
\end{aligned} \tag{5.17}$$

As explained above, P_L^* denotes the equilibrium domestic labour wage, while $\bar{P}_L^*$ denotes the internal shadow price of labour of the FH derived at equilibrium. Overall, equilibrium prices result from the following equilibrium conditions:

$$P_i^* = PW_i \quad i \in \{m, c, v\}$$

market clearance internationally traded good (5.18)

$$\Pi_a^a(p_a^*, r_a) - \sum_h C_a^h(p_h^*, Y_h^*) = 0$$

market clearance domestic food market (5.19)

$$\sum_{k \neq a} \Pi_L^k(p_k^*, r_k) + T_L^u - C_L^u(p_u^*, Y_u^*) - \Psi_L^{sc} = 0$$

market clearance domestic labour market (5.20)

$$T_L^r + \Pi_L^a(p_a^*, r_a) + \Psi_{\tilde{L}}^{sc} - C_L(p_r^*) = 0$$

time constraint of small-scale sector (5.21)

$$Y_u^* = \sum_{k \neq a} \Pi^k(p_k^*, r_k) + T_L^u P_L^* - R_c^B * P_B^* + E_u'$$

income of urban household (5.22)

$$Y_r^* = \Pi^a(p_a^*, r_a) + T_L^r \tilde{P}_L^* + (B - R_a^B) * P_B^* - TC((B - R_a^B)) + E_r'$$

income of rural household (5.23)

For notational convenience we define $p^* = \left\{P_a^*, P_c^*, P_m^*, P_v^*, P_L^*, \bar{P}_L^*\right\}$ as the equilibrium price vector and $y^* = \{Y_u^*, Y_r^*\}$ as the vector of household incomes defined in equilibrium of the economy.

5.2.4 Social Welfare, Price Beliefs and Transaction costs in Land Markets

Obviously, equilibrium prices and incomes are conditional on land allocation between small and large-scale farms. Accordingly, we can derive conditions determining an optimal allocation of land between the large and small-scale sector from maximizing the total welfare of society. To this end, we define households welfare applying indirect compensation functions, $\mu^h(p_h^0, p_h^1, Y_h^1)$, derived from a monotonic transformation of households the indirect utility function $V_h(p_h, Y_h)$:

$$\mu^h(p_h^0, p_h^1, Y^1{}_h) = e^h(p_h^0, V^h(p_h^1, Y_h^1))$$

Regarding the compensation function that transforms household's utility derived

under situation 1 into a money metric, i.e. the minimum income the household requires in a reference scenario, is defined by consumer prices p_h^0, to achieve the same utility level as in situation 1. Total welfare is just the sum of compensation functions of rural and urban households:

$$W = \sum_h \mu^h(p_h^0, p_h^1, Y_h^1)$$

Equilibrium conditions 5.18 - 5.23 define equilibrium prices and household income respectively as functions of land allocation. Accordingly, households' individual welfare are measured via money metric utility functions, μ^h, as well as total society welfare are a function of land allocation, i.e $R_a^B, [B - R_a^B]$. Hence, maximizing total welfare gives the following FOCs:

$$\frac{\partial W}{\partial R_B^s} = \sum_h \frac{\partial \mu^h(p_h^0, p_h^1, Y_h^1)}{\partial R_h^s} = \sum_h \left\{ e_u^h \left[\sum_{i \in CG \cap NT} V_i^h + V_y^h \frac{\partial Y}{\partial P_i^h} \right] \frac{\partial P_i^h}{\partial R_a^B} + V_y^h \frac{\partial Y^h}{\partial R_a^B} \right\} \tag{5.24}$$

In equation 5.24, $V_i^h = \frac{\partial V^h}{\partial P_i^h}$ denotes the partial differential of the indirect utility function with respect to the non-tradable consumer good price P_i^h, while $V_i^h = \frac{\partial V^h}{\partial Y^h}$ denotes the partial differential of the indirect utility function with respect to household income Y^h. Furthermore, $e_u^h = \frac{\partial e^h}{\partial U^h} = [V_y^h]^{-1}$. Accordingly, FOCs (5.24)can be rearranged as follows:

$$\frac{\partial W}{\partial R_B^s} = \left[X_a - \sum_h C_a^h \right] \frac{\partial P_a^*}{\partial R_a^B} \tag{5.25}$$

$$+ [T_L^r + \Pi_L^a(p_a^*, r_a) + \Psi_{\bar{L}}^{sc} - C_L(p_r^*)] \frac{\partial \bar{P}_L^*}{\partial R_a^B} \tag{5.26}$$

$$+ \left[\sum_{k \neq a} \Pi_L^k(p_k^*, r_k) + T_L^u - C_L^u(p_u^*, Y_u^*) - \Psi_L^{sc} \right] \frac{\partial P_L^*}{\partial R_a^B} \tag{5.27}$$

$$+ \Pi_B^a + mTC([B - RB_a]) - \Pi_B^c = 0 \tag{5.28}$$

It follows directly from the equilibrium condition that the first three terms of the

FOC (5.25- 5.27) are all zero. Thus, it follows then that the optimal land allocation is:

$$\Pi_B^a + mTC([B - RB_a]) - \Pi_B^c = 0 \tag{5.29}$$

Please note that in eq 5.29 domestic equilibrium prices; $P_a^*, P_L^*, \bar{P}_L^*$ are a function of land allocation. That is, optimal land allocation, R_a^{B*}, results as a fix point that simultaneously fulfils equilibrium conditions for the land market as well as domestic food and labour markets.

However, first understanding these fix point equilibrium is rather complex. That is, even assuming small-scale farmers could perfectly coordinate forming rational expectations appears rather unrealistic. Moreover, assuming uncoordinated expectation formation implies that even assuming individually rational expectation formation would not imply optimal land allocation. The later follows since it is rational from the viewpoint of an individual farmer to assume that her individual land market, production and consumption choices will have only a negligible effect on domestic prices. In this context we assume small-scale farmers apply naive heuristics when forming their beliefs about t.p. as well as future domestic food and internal shadow prices for family labour. To the extent that farmers' beliefs differ from the rational expectation equilibrium defined by eq 5.29 implies that land allocation is not Pareto-optimal.

Interestingly, assuming that small-scale farmers form biased beliefs in a way that FHs underestimate the increase in domestic food prices induced by a transfer of land to large-scale farms and also underestimate their transaction costs of accessing off-farm labour market implies that small-scale farmers are willing to lease too much land to large-scale farms when compared to the optimal land lease. Under these specific assumptions, high transaction costs on land market might counterbalance biased price beliefs. i.e. it might follow that land market policy reducing transaction costs for land transfers imply a decrease in the welfare of small-scale farmers as well as total welfare of the society.

To see this, we start with the comparative static of land market equilibrium, R_a^{B*}. We define $\alpha \in \{\tilde{P}_a \tilde{P}_L, \rho\}$ as any exogenous change in FH belief about the future food price or technical progress, P_a, internal shadow labour wage, $\bar{P}_L$, or shift in marginal transaction costs, ρ with $\frac{\partial mTC}{\partial \rho} \geq 0$.

The comparative static of land market equilibrium is shown as follows:

$$\begin{pmatrix} \Pi^a_{BB} & \Pi^c_{BB} \\ (1+TC''\Pi^a_{BB}) & -1 \end{pmatrix} \begin{pmatrix} \frac{\partial \bar{P}_B}{\partial \alpha} \\ \frac{\partial P_B}{\partial \alpha} \end{pmatrix} = \begin{pmatrix} -\Pi^a_{B\alpha} \\ -TC''\Pi^a_{B\alpha} - TCi'_\rho \end{pmatrix} \tag{5.30}$$

Π_{ij} denote the second-order differential with respect to the variable a and b, while TC'' and TC'_ρ denote the second-order differentials of transaction costs with respect to traded land and ρ the shifter of marginal transaction costs, respectively.

We also derive the following comparative statics which we further define as follows:

$$\begin{aligned} \Delta &= \det \begin{pmatrix} \Pi^a_{BB} & \Pi^c_{BB} \\ (1+TC''\Pi^a_{BB}) & -1 \end{pmatrix} \\ \Delta_{\tilde{B}} &= \det \begin{pmatrix} -\Pi^a_{B\alpha} & \Pi^c_{BB} \\ -TC''\Pi^a_{B\alpha} - TCi'_\rho & -1 \end{pmatrix} \\ \Delta_B &= \det \begin{pmatrix} \Pi^a_{BB} & -\Pi^a_{B\alpha} \\ (1+TC''\Pi^a_{BB}) & -TC''\Pi^a_{B\alpha} - TCi'_\rho \end{pmatrix} \end{aligned} \tag{5.31}$$

Then it follows from Cramer's rule that:

$$\begin{pmatrix} \frac{\partial \bar{P}_B}{\partial \alpha} \\ \frac{\partial P_B}{\partial \alpha} \end{pmatrix} = \begin{pmatrix} \frac{\Delta_{\tilde{B}}}{\Delta} \\ \frac{\Delta_B}{\Delta} \end{pmatrix} \tag{5.32}$$

From this calculation, we derive the following comparative static effects of the final land allocation:

$$\frac{\partial R^B_a}{\partial \alpha} = -\Pi^a_{BB}\frac{\partial \bar{P}_B}{\partial \alpha} - \Pi^a_{B\alpha} = \begin{cases} \frac{\Pi^a_{B\alpha}\Pi^c_{BB}}{\Delta} & \text{for } \alpha = P_a, \bar{P}_L \\ -\Pi^a_{BB}\frac{\Pi^c_{BB}TC''_\rho}{\Delta} & \text{for } \alpha = \rho \end{cases} \tag{5.33}$$

It is easy to show that assuming regular (convex) profit functions, as well as a convex transaction costs function, implies that Δ is always negative, while $\Pi^k_{BB}, \quad k = a, c$ is always positive. Hence, the sign of the comparative static effect of food price expectation (or t.p.) as well as of the labour wage, respectively, depend on the sign of the cross partial differential, $\Pi_{B\alpha}$. Assuming normal input-output relations between food and land input implies that $\Pi_{Ba} \leq 0$, i.e. higher expected food prices imply that FHs lease c.p. less land to large-scale farms in equilibrium. A contrary scenario, assuming labour and land are complementary inputs, implies that $\Pi_{BL} \geq 0$. Accordingly, the larger the future shadow labour wage expected by FHs, the larger is the amount of land FH are leasing to large-scale farmers. Finally, by assumption

$TC''_\rho \geq 0$. Thus, increasing marginal transaction costs of land transfers imply that FH will lease less land to large-scale farmers.

Overall, we can summarize by noting the following. As long as FH beliefs about future food prices (or total product) and future labour wage are biased in a way that these beliefs imply that farmers have incentives to lease too much or too less land to large-scale farmers when compared to the efficient coordinated rational expectation equilibrium, e.g. it holds that $\tilde{R}_a^B \neq R_a^{B*}$, the adaptation of marginal transaction costs of land transfer can increase FH's welfare as well as total welfare when compared to the equilibrium induced by biased beliefs and original transaction costs. Since we assume that marginal transaction costs can not be negative, this implies that biased beliefs are an equivalent to undershooting of land transfers, which can only be welfare-enhancing corrected via a reduction in marginal transaction costs. Accordingly, if land transfers are already characterized by rather low marginal transaction costs, compensation of biased beliefs is limited.

Formally, taking price beliefs of FHs as given implies that land market equilibrium allocation is a function of the shifter of marginal transaction cost ρ. Let $R_a^B(\rho, \tilde{p})$ denote this function. Then, total welfare (as well as individual welfare of rural and urban households) becomes a function of ρ. Let $\tilde{W}(\rho, \tilde{p}) = W(R_a^B(\rho), \tilde{p})$ denote this function. Assuming that $\tilde{W}$ is strictly concave in ρ [3], it will then directly follow that $\tilde{W}$ always has a unique maximum in ρ, i.e. for any price beliefs of small-scale farmers there exist an optimal shifter of marginal transaction costs $\rho^*(\tilde{p})$ that implies maximal total welfare for society. It also follows directly that assuming farmers hold optimal rational expectation beliefs implies optimal marginal transaction costs becomes zero, i.e. $\rho^*(p^*) = 0$. Additionally, it follows that $\tilde{W}$ is a single-peaked function in ρ. To wit, it holds that:

$$\|\rho_1 - \rho^*\| \leq \|\rho_2 - \rho^*\| \Rightarrow \tilde{W}(\rho_1) \geq \tilde{W}(\rho_2)$$

This follows directly from the properties of profit functions it thus holds that $\Pi_B^a - \Pi_B^c > 0$ as long as $R_a^B < R_a^{B*}$. Moreover, it also holds $mTC([B - RB_a])$ is decreasing in R_a^B, thus it already follows that $Pi_B^a + mTC([B - RB_a]) - \Pi_B^c > 0$ as long as $R_a^B < R_a^{B*}$. Finally, assuming that TC''_ρ does not increase with ρ implies already single-peakedness of $\tilde{W}$ in ρ.

[3] It follows already that W is concave in R_g^B as long as the restricted profit functions are concave in land as a quasi-fix factor and transaction costs are convex in land transfers.

Finally, given the comparative static of land market allocation with respect to price beliefs, it also implies that ρ^* increases the lower price beliefs are for food compared to rational expectation prices and the higher expected family labour wage compared to rational expectation for family labour wage.

5.2.5 A Political Economy Model of Land Market Policies

Assuming government can control land market policy γ which directly impact on ρ. We can formally capture the impact of land market policy on marginal transaction costs on land markets via a policy impact function $\rho = PIF(\gamma)$. Given that reform of land market policy involves bureaucratic efforts, let A denote total governmental efforts. Reform of land policy is captured via changing different policy dimensions, e.g. reforming land registration office or changing legal framework regulating land property rights, etc.

For notational convenience, we assume that each policy dimension ranges from 0 to 1, where 0 corresponds to a state inducing maximal transaction costs and 1 to a state inducing minimal low transaction costs. Further, we define for each policy dimension, a status quo denoted by γ_j^0, which represents the political cost of changing the policy status quo, e.g. loss in electoral support due to changes of the status quo or due to bureaucratic efforts required to change the status quo. We do not analyse political costs in detail in this paper, but rather assume that political costs of a reform policy, γ can be captured by weighted Euclidean distance to the status-quo: $PC(\gamma) = \sum_j \beta_j \|\gamma_j - \gamma_j^0\|^2$.

Hence, assuming the government is a political support maximizer, optimal land policy results from the following optimization process:

$$\text{I. Optimal transaction costs} \rho^* = \max_{\rho} \tilde{W}(\rho, \tilde{p}, p^*) - PC(\rho)$$

II. Optimal land market policy

$$PC(\rho) = \min_{\gamma} \sum_j b_j \|\gamma_j^0 - \gamma_j\|^2 s.t. : \sum_j a_j \gamma_j = \rho$$

In detail, we assume:

$$\tilde{W}(\rho, \tilde{p}, p^*) = \sum_i \phi_i \Delta W_i(\rho, \tilde{p}, p^*)$$

where, $\Delta W_i(\rho, \tilde{p}, p^*)$ denotes the welfare change of the social group i induced by

land reform policy, i.e. rural and urban population as well as large-scale farmers, respectively, and phi_i, the relative political weight of group i.

However, in real-world political systems, the government does not perfectly know neither farmers beliefs on future price development, $\tilde{p}$, nor the political costs of reforming land market policies. Accordingly, the government has to form beliefs to make rational policy choices. Hence, to the extent that a mismatch between governmental beliefs on the beliefs of farmers exists, policy failure results. Furthermore, a biased belief against first-best policy also results due to political costs. Following Henning *et al.* (2018a), political costs correspond to the electoral response of voters based on their anticipation of policy impacts. Accordingly, the more voters believe that land market reforms induce negative welfare impacts, the more they prefer the status quo policy and the higher are c.p. the political costs to implement land reform policies. Overall, policy failure might result due to biased policy beliefs of the government or due to biased policy beliefs of the voters Henning *et al.* (2018b). Interestingly, assuming governmental beliefs are biased towards rational expectation beliefs of farmers implies that government favours stringent land market reforms that induce rather low transaction costs for land transfers. However, if in contrast to governmental beliefs, small-scale farmers have in fact myoptic beliefs, this implies that low transaction costs are suboptimal from society's perspective. In this setting, biased voter beliefs favouring the status quo, i.e. too high transaction costs, might correct biased governmental beliefs favouring too low transaction costs.

5.3 Empirical application

5.3.1 Land Grabbing, Transaction Costs, and Land Market Policy Reforms in Sierra Leone

The need for reform of Sierra Leone's land laws and administrative structures [4] has dominated public discourse since the 1980s. Successive governments, scholars, and other commentators contend that the unwritten nature of customary land tenure systems, and the extensive role played by chiefs in facilitating all land transactions under customary tenure leads to legal uncertainties around property rights and results in tenure insecurity and uncertainties in land ownership (Ochiai, 2017b; Njoh and Akiwumi, 2012; Peters and Richards, 2011; Unruh and Turray, 2006). All of these are complicated by the fact that there is currently no system of registration of land titles in the country, making it impossible to ascertain, with certainty, the rightful property owners. Furthermore, because land is treated as an inalienable family property under the communal land tenure system, permanent transfer to other interests like foreigners, non-natives and corporations is prohibited (Unruh, 2008; Johnson, 2011). Even in instances of temporary transfers, including leasing, the law restricts foreigners to a 25-year tenancy, with a further option of extending for no more than 21 years. Accordingly, a number of scholars suggest that, in its present form, the current tenure systems, land laws, and regulations inhibit productivity, discourages investments and results in high transaction costs in the country's land market (Acemoglu *et al.*, 2014a; Ochiai, 2017b; Unruh, 2008).

With the new wave of large-scale land acquisition that commenced in 2018, another layer of complexity has been added to already complex land administrative arrangements. This comes in the form of further approvals required from central and local government authorities before any land acquisition process is completed (Baxter and Schaefter, 2013; Oakland Institute, 2012). For instance, the leased fees paid to land-owners in some of the reported land acquisitions were not negotiated, but in fact, based on a guideline from the country's Ministry of Agriculture in an investment guideline. The guideline stipulated that the yearly annual rental fee should be

[4] Sierra Leone operates a two-tier land tenure system. The first, the freehold tenure systems, draws on the country's colonial past and is based on the English system of governance. It is applicable only in the capital city of Freetown and its immediate environs, which makes up less than 1 percent of the country's total land-mass. The second land tenure system, the customary land tenure system, is based on customary laws. This system applies to all other regions in the country apart from the Western area, which makes up to about 99 percent of the country's land mass

distributed among land-owners (50%), central government (10%), chiefdom administration (20%), land local government (20%) (Government of Sierra Leone, 2011).

In the wake of the increasing acquisition of a large swath of farmland by foreign investors that resulted in the displacement of small-holder farmers in rural Sierra Leone, the calls for land reforms grew even louder (Ochiai, 2017a; Melsbach and Rahall, 2012; Moyo and Kamara, 2009). As sections of local farmers and other land users in the country continue to protest and resist forced eviction from land acquired by large-scale farmers in some of the major land acquisition projects (FIAN, 2019; Reuters Africa, 2016), Sierra Leone has become one of the poster cases of a country where the so-called "land grabbing" situation is unfolding. As a result, on the one hand, advocates in favour of large-scale investment in agricultural land led calls for reforms to end the cumbersome land transfer process and ensure that the most productive actors can easily have access to land (Johnson, 2011; Sierra Leone Investment and Export Promotion Agency, 2010). On the other hand, civil society organisations and other interest groups that are in favour of protecting the interest of small-holder farmers supported the calls to reform land laws and regulation to strengthen the tenure security of land users through a land title registration system that will ensure secure property rights of small-holder farmers (Baxter and Schaefter, 2013; Green Scenery, 2011).

It is within this context that the Sierra Leone government initiated a comprehensive land reform program in 2009. Officially, the land reform policy formulation process commenced with the establishment of a national land reform project by the Ministry of Land and Housing and the Environment, followed by a scooping activity in 2009 (Moyo and Kamara, 2009). At the end of a long and laborious process that included town hall meetings and multi-stakeholder platforms which brought together stakeholders from the governments, donor community, civil society organizations, women's group and traditional leaders, a policy document titled "National Land Policy" (NLP) was produced and formally launched by President Koroma in March 2017. The aim of the land reform program was to help spur economic growth and development, encourage foreign direct investment into the agricultural sector, and to reduce bottlenecks and the high transaction costs associated with land transfers and acquisition in the country (Ministry of Lands Country Planning and the Environment, 2015).

5.3.2 Methodological Strategy

To apply our theoretical framework empirically to the land market policy reform in Sierra Leone we proceed as follows.

1. We specify a Computable General Equilibrium (CGE) model for the economy of Sierra Leone. In the CGE model, agriculture is disaggregated into a small-scale and large-scale sector where land and capital, separately operated by the small and large-scale farming sectors, are considered to be quasi-fix factors. The CGE-model is linked to land market module, where land transfers between small- and large-scale farmers are modelled. Farmers land transfer decisions are based on their future price beliefs, i.e. land transfers are derived from profit maximization functions that assume that farmers beliefs on future output and input prices as well as off farm labour. Moreover, we assume that land transfers involve transaction costs. In particular, we assume that transaction costs are quadratic in total land transfer ΔR_B, i.e. $TC = \rho \Delta R_B^2$. On the demand side, the model incorporates two household types, urban and rural households. Rural households correspond to small-scale farm households, i.e. they own total land and collect all profits from small-scale farming as well as revenues from land rented to the large-scale sectors based on agreed land contracts. Moreover, rural households receive income from labour supply, where total labour of rural households is fixed and allocated between working on own farm and working off-farm. Labour allocation between on-farm and off-farm work is characterized by transaction costs, which are formally captured via a Constant Elasticity of Substitution (CET) function. All other profits from the large-scale sector as well as the non-agricultural sector are collected by the urban household. Moreover, the latter receives wages from fixed labour supply on the off-farm labour market. To simplify our analysis further, we assume that there is only one non-agricultural sector, m, which produces a non-agricultural good, X_m, using labour as variable input and capital as quasi-fix input. This non-agricultural good is used for final consumption as well as an intermediate input, X_v. The small-scale farm sector produces one output, X_a, using intermediate inputs, v and farm labour, $\bar{X}_L$, as variable inputs and capital, R_k^a and land R_B^a as quasi-fix inputs. The large-scale farm sector also produces one output, X_c, using labour, L and intermediate inputs, v, as a variable inputs and capital, R_k^c and land, R_B^c, as quasi-fix inputs. Large-scale output, non-agricultural outputs as well as intermediate inputs are tradable, i.e. domestic prices are

fixed and equal to the corresponding world market price, $P_i = Pw_i, \forall i in PT$. Small-scale output, X_a, as well as labour are non-tradable, i.e. domestic prices are determined by domestic market equilibrium.

2. The model is sequentially solved simulating different transaction costs. The latter is technically modelled simulating different parameters, ρ. Moreover, for each transaction costs parameter, the linked model is solved in two versions. First, a ***biased-belief-scenario*** is simulated assuming myoptic beliefs of farmers, e.g. farmers derive their land transfers assuming output prices and domestic labour wage remains constant to base run values. Second, a ***rational expectation scenario*** is simulated assuming farmers form rational expectations when deriving their land transfers. Technically, the CGE-model and the land market model are sequentially solved in a loop, where farmers price expectations in the land market model are derived from the previous CGE-solve and vice-versa. Land market endowments of small and large-scale farmers in the CGE-model are taken from the previous solve of the land market model. When land endowments and price beliefs corresponds to a value that falls between both models, the loop stops. Based on simulated equilibria, the welfare of urban and rural households, as well as the profits of large-scale farms are calculated. Moreover, based on simulations welfare and profits are approximated as a second-order Taylor approximation developed at the maximum as shown below:

$$\Delta W_i = \omega_i [\Delta \rho]^2 \; \Delta W_i = W_i(\rho) - W_i(\rho^{max} \; \Delta \rho = \rho - \rho^{max}$$

3. Using a policy survey data collected during an elite network survey in Sierra Leone between September and November of 2018, the policy beliefs of relevant stakeholders are estimated by applying a Bayesian estimation procedure based on first-order condition of political support maximization. In particular, let $i = r, u, ls$ denote the index for rural and urban households and large-scale farmers, respectively, while $g \in G$ denotes the index of relevant stakeholders. Moreover, let λ denote the probability that farmers hold myoptic price beliefs, while $(1 - \lambda)$ denotes the probability that farmers hold rational expectation price beliefs. Further, let a and b denote the parameter vectors characterizing how land policy translates into transaction costs and political costs, respectively. Assuming we have data $y = \hat{\gamma}, \phi$ on individual optimal policy positions $\hat{\gamma}_g$ desired by a set of stakeholders N^g, where $g \in N^g$ denotes the index of an individual stakeholder organization. Furthermore, data y includes stake-

holder's relative interest in the welfare of social groups, i.e. ϕ_g, denotes the vector of relative political interests for stakeholder g. Assuming further that observed policy positions of individual stakeholders are generated from political support maximization. These data are informative regarding the policy beliefs of stakeholder g, i.e. the underlying parameters λ, a, b. For notational convenience let $\theta_g = (\rho_g, a_g, b_g)$ denote the vector of the unknown parameters of political support function, while γ_g denotes the vector of land market policy positions observed for stakeholder g. Then, θ_g has to fulfil the following FOCs derived from political support maximization:

$$\begin{aligned}
\rho_g &= \lambda_g \sum_i \frac{\phi_i \omega_i}{\sum_k \phi_k \omega_k + \delta_g} \bar{\rho}_i^{mo} + \frac{\delta_g}{\sum_k \phi_k \omega_k + \delta_g} \\
\rho_g &= \sum_r a_r \gamma_r \text{ and } \sum_r a_r = 1 \\
\delta_g &= \frac{\sum_r b_r k_r}{\sum_r a_r k_r} \\
k_r &= \frac{a_r b_{r_0}}{b_r a_{r_0}}
\end{aligned} \tag{5.34}$$

The index r_0 just indicates a normalization policy.

The equation system FOC (y,θ) in equation 5.34 has a large number of solutions, ie. there exist many parameter vectors θ, for which the FOC hold given the data y. The stakeholder data, y, however is informative in the sense that the data serves to narrow down the feasible space of solutions for the unknown Policy Impact Funtion (PIF) parameters. In this regard additional prior information held by the analyst can be used to obtain a solution to the FOCs given the data y. If $Pr_r(\theta_r)$ represents a prior distribution for the r^{th} component of θ and if the prior distributions are considered to be independent, then a Bayesian estimation of the PIF-parameters can be obtained from the solution of the following maximization problem:

$$\begin{aligned}
&\theta^* = arg \max_\theta p(\theta) = \prod_r P_r(\theta_r) \\
&s.t. \\
&FOC(y, \theta) \equiv 0
\end{aligned} \tag{5.35}$$

Formally, the Bayesian approach to parameter estimation treats the PIF-parameters, θ, as stochastic variables. In particular, the Bayesian approach distinguishes, in this context, between the prior density, $pr(\theta)$, summarizing prior information on parameters, the Likelihood function, $L(\theta \mid y)$, representing the information obtained from the data in conjunction with the assumed

model, and the posterior density, $pr(\theta \mid y)$, where the latter is the result of combining prior and data information based on Bayes' theorem (see e.g. Heckelei *et al.*, 2008). The relationship between these three elements can be expressed as follows (see e.g. Zellner, 1971):

$$pr(\theta \mid y) \propto pr(\theta) L(\theta \mid y), \tag{5.36}$$

where the posterior density is proportional to the prior density multiplied by the Likelihood function. The posterior density allows drawing statistical inference about θ using probability statements or by deriving point estimates that are optimal with respect to some loss criteria.

The Likelihood function, in this case, can be interpreted as an indicator function I_{FOC} that assigns weights of 1 to admissible values of θ and 0 otherwise. Hence, the posterior is then in the form: $pr(\theta \mid y) \propto pr(\theta) I_{FOC}(\theta)$. Consequently, the argument, θ^*, that maximized the prior probability $p(\theta)$ subject to the constraint $FOC(\theta, y)$ will provide a Bayesian highest posterior density (HPD) solution to the equation system FOC. In general, these results have been nicely derived by Heckelei *et al.* (2008).

In particular, the Bayesian framework allows for the use of any prior distribution. Thus, assuming the prior density function would be a normal distribution $\theta \sim N(\bar{\theta}, \Sigma)$, where the covariance matrix is set equal to the diagonal matrix (θ^2) implying that the HPD estimator results from the following maximization problem (see e.g. Heckelei *et al.*, 2008, 17):

$$\begin{aligned} &\theta^* = arg \max_{\theta} \left[\theta - \bar{\theta}\right] \Omega^{-1} \left[\theta - \bar{\theta}\right] \\ &s.t. \\ &FOC(y, \theta) \equiv 0 \end{aligned} \tag{5.37}$$

As can be seen from equation 5.37, the choice of a normal prior distribution results in a weighted least square approach, implying numerically desirable properties for large-scale problems. Therefore, we follow this approach in our empirical application below.

5.4 Empirical Setting: Study Design and Data Collection

Our empirical results are based on an elite network survey conducted in Sierra Leone between October and November of 2018. We collected data about stakeholder policy preferences, positions and the exchange of expert information and political support within Sierra Leone's land reform policy network. To ensure that stakeholders' policy positions, preferences and interests were comparable, we used specially standardized questionnaires normally used in policy network studies (see Knoke *et al.*, 1996; Laumann and Knoke, 1987; Laumann *et al.*, 1989; Pappi and Henning, 1999b; Henning, 2009). Such standardized questionnaires (see B.1) make it possible to identify the location of stakeholder organisations within a policy domain in a manner that allows for empirical assessment of metric distances between members of a policy network. Our focal points were set of organisations that had formal power or vested interest in the land reform policy process (see Pappi and Henning, 1999a). We focused on the official positions or preferences of organisations and not individuals within the organisations because the latter held formal responsibilities for specific policy domains. Hence, the units of observation in our survey were stakeholder organizations who were regarded as corporative actors (Coleman, 1990), As a result, before the commencement of the administration of all our questionnaires, we emphasized to respondents that we were particularly interested in the views and positions of their organizations and not their personal opinions.

To ensure an efficient analysis of the land reform policy process in Sierra Leone, our starting point was setting the boundaries of our policy network by consistently specifying the most relevant and influential members of the policy network. This identification process was done following a two-step approach commonly used in policy network studies (see Henning *et al.*, 2019, 2018a; Pappi and Henning, 1999b). First, through desk review and expert interviews, we identified organizations that have either formal political power or access to formal powerful actors in Sierra Leone's land policy domain due to their institutional position. This resulted in a preliminary list of 107 organizations. In the second step, we conducted personal interviews with organisations from our preliminary list, beginning with governmental organizations and the most important interest groups (i.e., farmer organizations, civil society organisations, donors etc). Using a reputation question in our interviews, respondents were requested to mark all organizations they perceived as influential on our preliminary list. In instances where their preferred organizations were not part of the

list, respondents were encouraged to add new organizations to our preliminary list. The question was framed in such a way that respondents did not have to put great effort in identifying and marking organizations that they deemed influential in the policy domain. This framing assumes that highly important organizations will come quickly to their mind. Organizations that received three or more nominations were subsequently interviewed. This approach was used to further identify important actors using a snow-ball sampling method. This framing also allowed for network boundaries to be specified. Specifically, actors marked the organizations whom they perceive as an influential actor in the agricultural and land policy domain. Given that the corresponding socio-matrix G, g_{ij} corresponds to the answer of i that actor j is an influential organization. An indegree of centrality, shown in equation 5.38, is calculated and used as reputation measurement:

$$d_j = \sum_j g_{ij} \ \forall i \neq j \tag{5.38}$$

An actor, j, is not part of the network if $d_j = 0$.

A total of 39 stakeholder organizations were interviewed. The organisations were divided into groupings based on organizational type. An overview of the list of interviewed organization, together with their indegree of centrality, a proxy for the perceived influence of an organization, is presented in table 5.1

5.4.1 Policy Interest and Policy Beliefs data

Our questionnaire was divided into five parts. Hiowever, for this paper, we only used data collected in parts 1 and 3. In part 1, we collected data about the policy preferences of stakeholder organisations concerning prioritized policy concerns selected from the following national policy documents: Sierra Leone's Comprehensive African Agricultural Development Plan (CAADAP) compact and the country's Medium-Term National Development Plan 2019 -2023 (Ministry of Agriculture Forestry and Food Security, 2009; Government of Sierra Leone, 2019). Specifically, respondents were asked about their relative interest in and preferred policy position regarding the achievements of the following policy concerns $\boldsymbol{Z}$: Z1, the welfare of small-holder farmers; Z2, the welfare of large-scale farmers; Z3, the welfare of urban consumers.

In part three of our questionnaire, we focused on the policy reform instruments covered in the 2015 national land reform policy document (Ministry of Lands Country Planning and the Environment, 2015). We asked respondents about their relative

Table 5.1: Interviewed Organizations

Acronym	Orgname	Orgtype	IDC
OPRES	Office of the President	EXEC	0.87
MAF	Ministry of Agriculture and Forestry	EXEC	0.97
MOF	Ministry of Finance	EXEC	0.84
MLHE	Minister of Lands, Housing and Environment	EXEC	0.95
MLGRD	Minister of Local Government and Rural Development	EXEC	0.68
MOPED	Ministry of Planning and Economic Development	EXEC	0.66
MTI	Ministry of Trade and Industry	EXEC	0.71
BSL	Bank of Sierra Leone	PUBAG	0.66
EPA	Environmental Protection Agency of Sierra Leone	PUBAG	0.66
NRA	National Revenue Authority	PUBAG	0.66
SLIEPA	Sierra Leone Investment and Export Promotion Agency	PUBAG	0.79
Stats SL	Statistics Sierra Leone	PUBAG	0.68
APC	All Peoples Congress	LEG	0.39
SLPP	Sierra Leone Peoples Party	LEG	0.45
PCAF	Paliamentary Committee on Agriculture and Forestry	LEG	0.55
DC	District councils	LGVT	0.79
PC	Paramount Chiefs	LGVT	0.89
ALLAT	Action for Large-scale Land Acquisition Transparency	CSO	0.32
GS	Green Scenery	CSO	0.55
ADB	African Development Bank	DONOR	0.68
DFID	Department for International Development of the British Government	DONOR	0.55
EU	European Union	DONOR	0.84
FAO	Food and Agricultural Organisation of the United Nations	DONOR	0.79
IMF	International Monetary Fund	DONOR	0.76
UNDP	United Nations Development Programme	DONOR	0.89
WB	World Bank	DONOR	0.82
WFP	World Food Program	DONOR	0.68
Action Aid	Action Aid	iNGO	0.26
NAMATI	NAMATI	iNGO	0.37
WHH	Welt Hunger Hilfe	iNGO	0.68
SLARI	Sierra Leone Institute of Agricultural Research	RESEARCH	0.47
NU	Njala University	RESEARCH	0.42
DWFC	District Women's Farmers Cooperatives	IG:PROD	0.45
NFFSL	National Federation of Farmers of Sierra Leone	IG:PROD	0.82
SLPMC	Sierra Leone Produce Marketing Company	IG:AGIND	0.55
SLCAB	Sierra Leone Chamber of Agri-Business	IG:AGIND	0.42
SLCCIA	Sierra Leone Chamber of Commerce, Industry & Agriculture	IG:AGIND	0.53
AYV	African Young Voices Radio/Television	MEDIA	0.24
RADIO D	Society for Radio Democracy 98.1 FM	MEDIA	0.39

Source: Calculated by authors from own data.

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interest in the achievement of the main land reform policy instruments. Using a 7-point ordinal scale, we also collected data about stakeholder organizations' policy positions regarding the main land reform policy issues articulated in this policy document (see table 5.2 for a description of the main land reform policy issues extracted from the 2015 National Land Policy document). To ensure comparability and enable the assignment of actors to specific locations within our policy space, our ordinal scale had fixed and meaningful poles, with a rating scale that ranged from 1 to 7. The scale served as an empirical metric to measure the distances between actors in the policy space. On the one extreme is 1, a position that represents a world where a stakeholder organisation supports wholesome reform to lower the level of transaction in the land market to zero. On the other extreme is 7, a position that represents a world where a stakeholder organisation is opposed to reform and instead prefers the existing status quo. This equates to a preference for maintaining the status quo of high transaction costs in the land market. In essence, policy positions close to 1 signify support for lower levels of transaction costs, while those close to 7 prefer higher levels of transaction costs [5].

The full list of the policy positions is listed in table 2.1.

Table 5.2: Description of land reform policy beliefs and interests

Policy Positions	Variable
Establishment of a new land administrative framework	New_Admin_Frame
Customary land governance reform	Customary_Reform
Establishment of a comprehensive land title registration system	Land_Titling
Land demarcation, mapping and survey services	Map_Survey
Land property rights of women	PR_Women
Land property rights of foreigners	PR_Foreigners
Taxation of land leasehold fees	Tax_LHF
Land property rights of large-scale land investors	PR_LSLI
Land property rights of small-holder farmers	PR_SHF

Source: Authors own representation.

[5]It should be noted that our main aim here is to predict the true policy beliefs of the different stakeholders and how the exchange of expert information affects the belief formation process. Thus, our variable construction should be regarded as purely illustrative.

5.4.2 Data Sources for Welfare Analysis

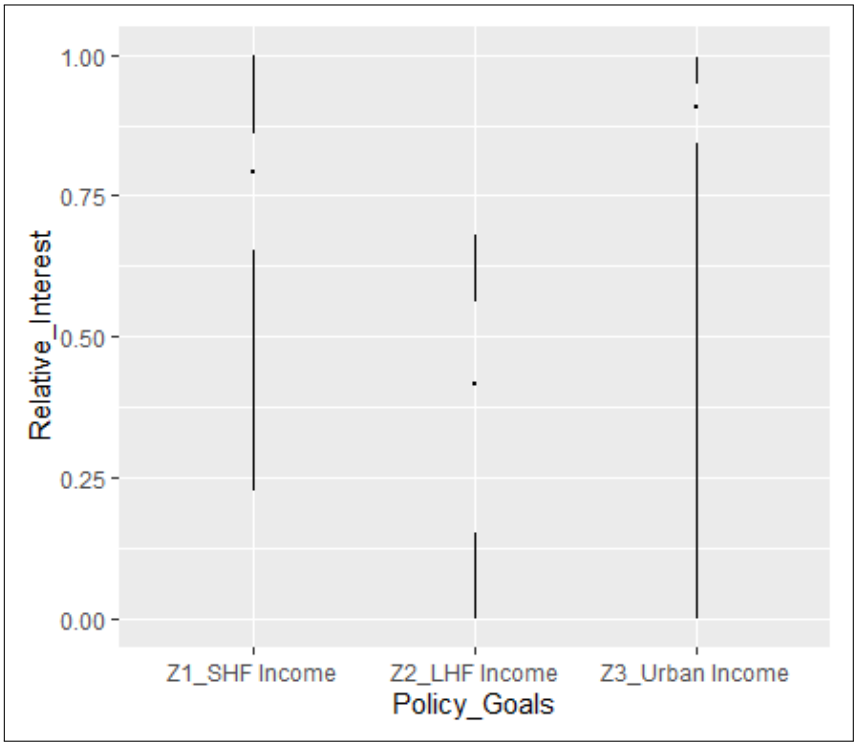
We used a Computable General Equilibrium (CGE) model to calculate our welfare indicators. We calibrated our model using a 2015 Social Accounting Matrix (SAM) for Sierra Leone constructed by the African Growth and Development Policy (AGRODEP) Modeling Consortium (Fofana *et al.*, 2014). Before the calibration process, following from Traoré *et al.* (2019), we employed the cross-entropy method to update the SAM to a 2018 version using based on data from the World Bank (The World Bank, 2019).

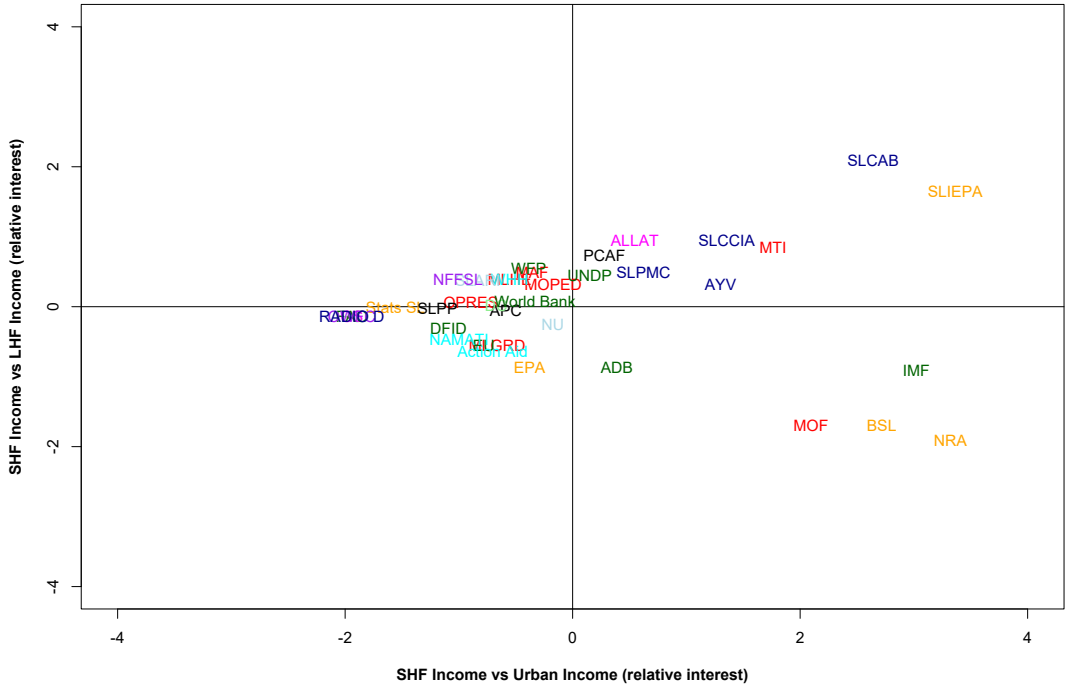
5.4.3 Political Incentives and Preferred Transaction Costs

Policy preference data, as stated in figure 5.1, were collected during personal interviews in our elite network survey. From this data, we derived the political incentives of the various stakeholders in the policy network based on their relative interest in maximizing the welfare of small-holder farmers, urban consumers and the profit of large-scale farmers. This is done by summarizing the incentives into specific agro-political policy goals. Specifically, we reduce the complexity of the number of policy incentives using principal component analysis, a method suitable for the extraction of a lower number of unobserved uncorrelated variables from observed correlated variables.

The upper plot in figure 5.1 presents an overview of the weights stakeholders place on the achievement of generic policy goals. In the case of the three generic policy goals we collected data on, we observe a larger interquartile range of values for Z2 (Welfare of large-holder farmers) compared to Z1 (Profit of large-scale farmers) and Z3 (Welfare of urban consumers). The median values, denoted by the single dots in-between the lines, are also very similar for Z1 and Z3. Results from this plot also indicate that maximization of the welfare of urban dwellers (Z2), and small-holder farmers (Z1) are the two most important goals prioritized by stakeholders, while the political incentives for maximizing the profits of large-scale farmers are quite low. This might be an indicator of the presence of strong specialized farm lobby groups and the influence exerted by urban households in not electing governments that do not respond to their needs (Birner and Resnick, 2010).

Figure 5.1: Aggregate Political Incentives for Policy Goals Achievement (Top) and within Policy Network (bottom)



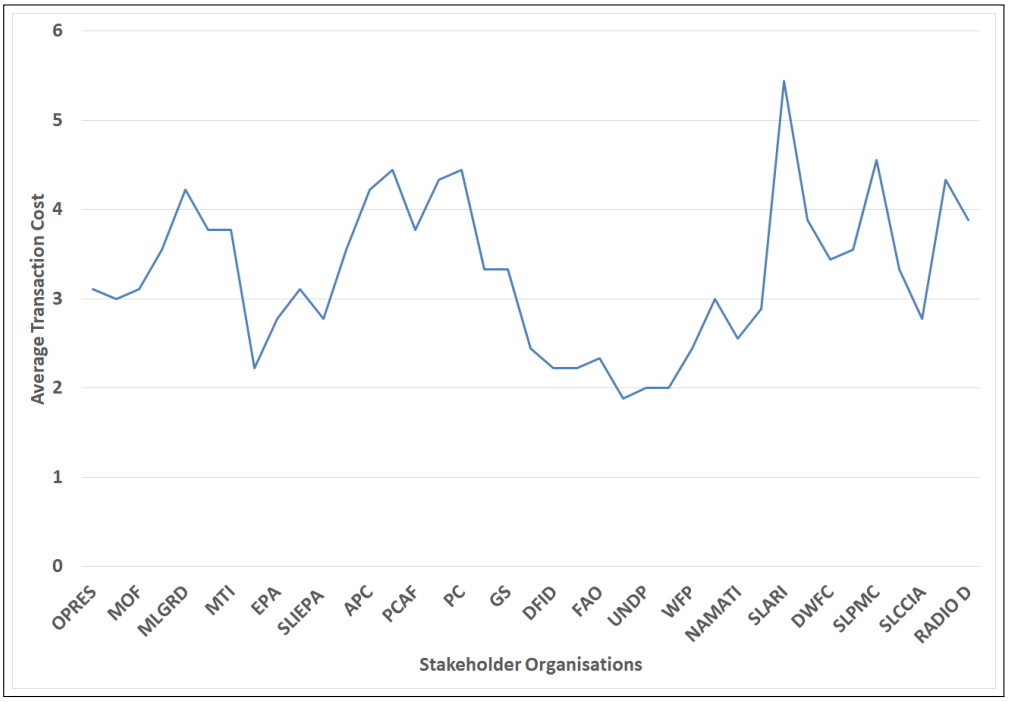


Source: Own presentation of survey data.

Representing this in the policy space, as shown in the bottom plot of figure 5.1, we are able to deduce that some of the most powerful actors in the financial management sector of the country favour improving urban income over that of small-holder farmers and large-scale farmers. These include the Ministry of Finance (MOF), the Central Bank of Sierra Leone (BSL), the country's National Revenue Authority (NRA), and the two most important international providers of funds to the government, The International Monetary Funds (IMF) and the African Development Bank (ADB). Interestingly, most of the important government actors; including the office of the President, the Ministry of Agriculture, and the Ministry of Planning and Development, the national farmer's organisation (NFFSL), the premier research institute in the country, the Sierra Leone Agricultural Research Institute, and some donor organisations; including the World Bank and the World Food Programme (WFP), prioritize improving the profit of large-scale farmers over that of the welfare of small-holder farmers. Only few stakeholder organisations support improving the income of small-holder farmers over that of large-scale farmers or urban dwellers. The most prominent actors in this quadrant are the legislators of the two main political parties in the country (The Sierra Leone Peoples Party (SLPP) and the All Peoples Congress (APC)), the Ministry of Local Government and Rural Development, two public agencies; the Environmental Protection Agency, and Statistics Sierra Leone, and the British donor organisation formerly known as the Department for International Development (DFID).

In relation to political agents preferred policy positions regarding land market policies, based on the graph in figure 5.2, we can identify a block of political agents that are particularly interested in lowering transaction costs in the land markets. Apart from the Central Bank of Sierra Leone, all the other top ten organisations that favour reducing transaction costs in the land markets are donor organisations. They include; IMF, UNDP, World Bank, DFID, the EU, FAO and AfDB. The plot also shows that the most powerful actors in government, including the office of the President, the Ministries of Agriculture, Finance, and Lands, together with Civil Society Organisations and Farmer Organisations favour the reduction of transaction costs, but only up to a mid-way point and do not want it to be totally eliminated. On the extreme end are legislators of the two main political parties (the SLPP and the APC), Paramount Chiefs, Local governments and Media organisations who are against reforms that lower levels of transaction costs in the land markets.

Figure 5.2: Political Agent's Preferred Average Transaction within Sierra Leone's Agricultural and Land Policy Network



Source: Own presentation of survey data.

5.5 Results

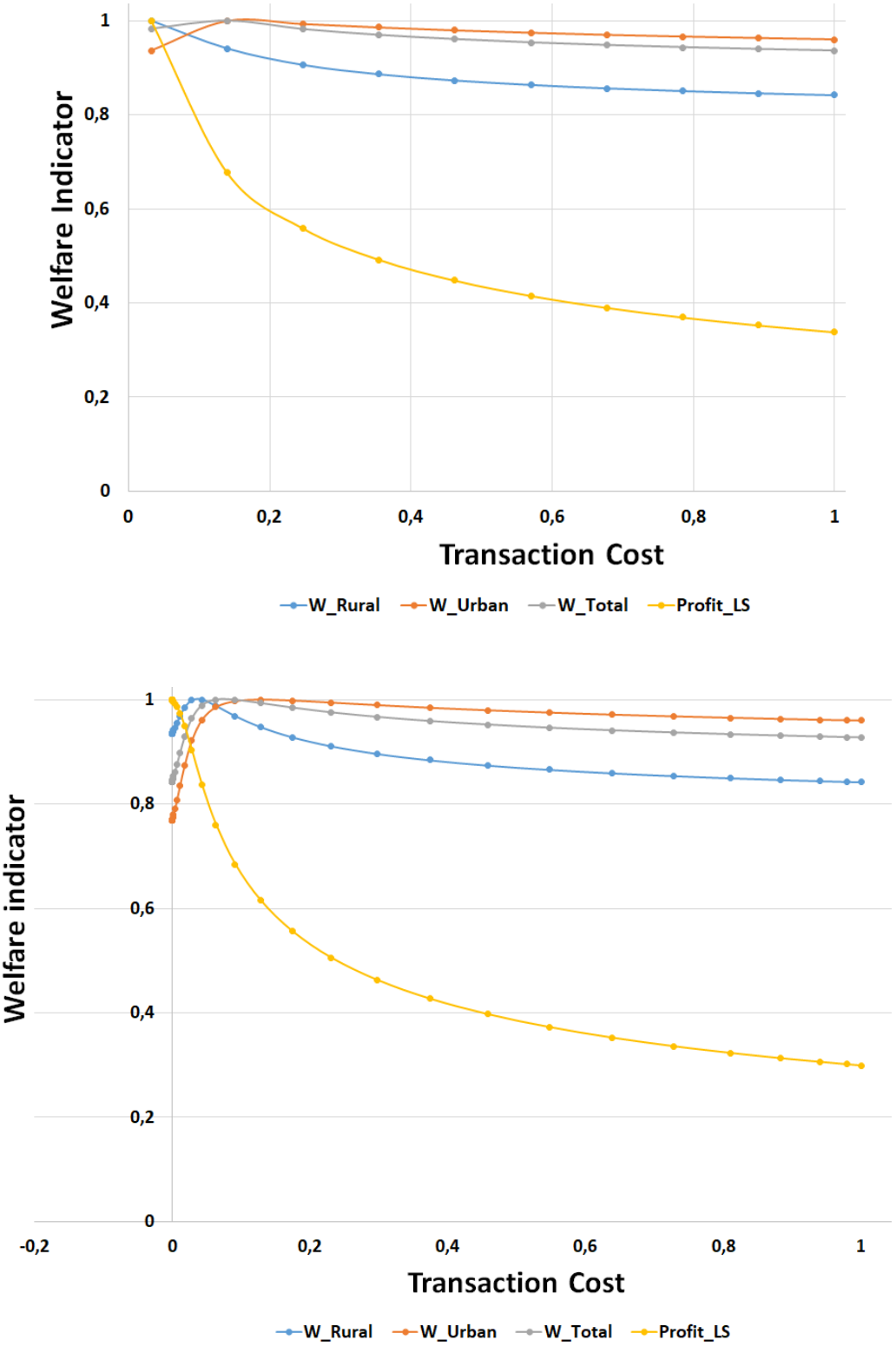
5.5.1 Price Beliefs of Small-scale Farmers, Transaction Costs and their Welfare Implications

The first important results of our empirically specified economic model, presented in the top and bottom graphs of figure 5.3, correspond to the effects of transaction costs on the welfare of rural and urban consumers, and the profit of large-scale farmers under the non-rational expectation equilibrium and rational expectation equilibrium respectively [6]. Specifically, as can be seen from the top graph in figure 5.3, assuming farmers form rational expectations implies that transaction costs of land transfers have a monotonically negative impact on both the welfare of small-scale farmers (rural farm households) as well as on large-scale farm (large-scale land investors) profits. The logic of this observation is straightforward as transaction costs of land transfer impede an efficient land allocation among small and large-scale farmers, which negatively affects the profits of both groups of farmers. However, as can be seen from the top half of figure 5.3, for urban consumers, some transaction costs on land transfers are welfare increasing. The logic of these seemingly surprising results follows from the fact that transaction costs on land transfers imply that total land allocated to the small-scale sector is higher when compared to an optimal allocation. Accordingly, ceteris paribus, domestic food supply is comparatively higher, while off-farm labour supply of small-scale farmers is comparatively lower, implying lower domestic food prices and higher off-farm labour wage rates. Both favour urban consumers as demanders of domestic food and suppliers of off-farm labour. However, if transaction costs are too high, the negative impact on farm income overcompensate for these positive impacts and results in an overall decrease in the welfare of urban consumers.

In essence, under rational expectation equilibrium, the profits of large-scale farmers increase as transaction costs decrease, with maximum welfare attained when transaction cost is zero. Similarly, the welfare of rural farm-households increase as

[6] As already stated in section 5.2, under rational expectation equilibrium, we assume that stakeholders form beliefs based on the assumption that farm households have unbiased belief about how land transfers affect food prices and off-farm labour wage rates. This belief is closer to the true world and based on the assumption that future prices after land transfer will be different from present observed prices. The opposite is true for non-rational expectation beliefs where stakeholders belief is based on the assumption that rural farming households have a biased belief about how land transfers affect food prices and off-farm labour wage rates affect. This belief is farther from the true world and based on the assumption that future prices after land transfers will be equal to the present observed prices.

Figure 5.3: Welfare Effects of Transaction Cost Under Rational Expectation Equilibrium (top) and Non-Rational Expectation Equilibrium (bottom)



Source: Own presentation of survey data.

transaction cost falls, with welfare peaking when transaction costs are zero. This is because, small-holder farmers, in a rational choice equilibrium scenario, are expected to factor in the possibility that future food and off-farm wage rates will change when land is leased or sold to large-scale farmers. This means that they would either lease land at a high enough price to compensate for price changes or will simply not transfer as much land as they would in the non-rational choice equilibrium. However, urban consumers still only attain their maximum welfare when the optimum transaction costs [7] are non-zero.

In contrast, assuming myoptic price beliefs implies that, ceteris paribus, small-scale farmers are too pessimistic about future output prices and hence transfer too much land to the large-scale farm sector. Accordingly, non-zero transaction costs on land transfers correct myoptic price beliefs and hence are welfare increasing even for small-scale farmers. This can be nicely seen from the graph in the top half of figure 5.3. However, assuming myoptic beliefs of small-scale farmers, ceteris paribus, favours large-scale farmers as they acquire land relatively cheap from farm households. Accordingly, even under myoptic beliefs, profits of large-scale farmers monotonically decrease with the presence of non-zero transaction costs. In essence, the impact of transaction costs on farmers' welfare is not trivial as can be seen from the bottom graph in figure 5.3, where we normalized maximum welfare to 1. Assuming myoptic price beliefs signifies that zero transaction costs imply a welfare loss amounting to 16% for small-scale farmers, and up to 70% of reduction in profit levels for large-scale farmers. In the case of urban consumers, welfare derived from zero transaction costs amounts to only 4%.

The implications are that non-zero transaction costs are necessary for maximising the welfare of rural and urban households in the non-rational equilibrium scenario for two different reasons. First, in the case of small holder farmers, since farm households are assumed to hold a myoptic belief that future domestic food prices and off-farm wage rates will be equal to the present observed prices after land transfer, they are likely to transfer a huge portion of their land holdings to large-scale farmers. However, given that the large-scale transfer of land from small-farm households to large-scale farmers would reduce the production capacity of small-holder farmers, depress domestic production of food, and increase farm households' supply of excess labour to off-farm labour market, these transfers would result in an increase in

[7] Based on our model, the optimum transaction costs are the level of transaction costs that a stakeholder organisation believes is required to maximize the welfare of the rural farm-households. The rural farm households, based on Statistics Sierra Leone (2018) are assumed to be the poorest segment of the Sierra Leonean population

domestic food prices and a reduction in the off-farm wage rates respectively. The net effect would thus be a fall in the welfare of rural households. This explains why a non-zero level of transaction cost is required to prevent farm-households from transferring a large portion of their land holdings to large-scale investors if they hold myoptic price expectation beliefs.

Second, the impact of land market transaction costs on the welfare of urban households, assuming myoptic beliefs of small-scale farmers, does generally follow an inverse u-shape as can be seen from the graph in the lower half of figure 5.3. This implies that an even higher level of transaction cost - than that essential for rural households - is required to maximize their welfare. This is because, to increase the welfare of urban consumers, domestic food prices would have to be kept low, while off-farm labour wage rates are kept high. For this to happen, rural farm households have to be prevented from leasing a significant portions of their land to large-scale farmers to keep domestic food production high and maintain low prices. Such an action also limits off-farm labour supply, thereby keeping off-farm wage rates at a higher rate.

In sum, these results suggest that political agents who have a high incentive in maximizing the welfare of small-holder farmers and hold the belief that farm households have non-rational expectation beliefs should prefer high transaction costs to prevent small-holder farmers from transferring huge tracts of land to large-scale farmers. On the contrary, stakeholder organisations who hold the belief that farm households hold rational-expectation equilibrium beliefs should prefer low transaction costs if their policy preference is to maximize their welfare. Regarding stakeholder whose primary interest is in maximizing the welfare of urban consumers, they should prefer non-zero transaction cost irrespective of the belief of farm households. In the case of large-scale farmers, interest groups who want to maximize their welfare should always prefer zero or low levels of transaction cost to enable them maximize profit.

5.5.2 Estimating stakeholder beliefs and preferred land market transaction costs

Next, based on our theory, we use a Bayesian estimation technique to derive the induced level of transaction cost, ρ_g, preferred by the various political agents' within Sierra Leone's land policy network, and the estimated policy beliefs, λ_g, that drive these preferences. As explained in the previous section, the parameter λ_g corre-

sponds to stakeholders' policy beliefs regarding small-scale farmers beliefs about expected future price changes that might result from land transfers to large-scale farmers, while the parameter ρ_g represents stakeholder organisations' preferred level of transaction cost in the country's land market. Both these parameters, presented in 5.4, provide insights about whether the preferred transaction costs of stakeholder organisations' in the Sierra Leonean land market are driven by policy belief or incentives.

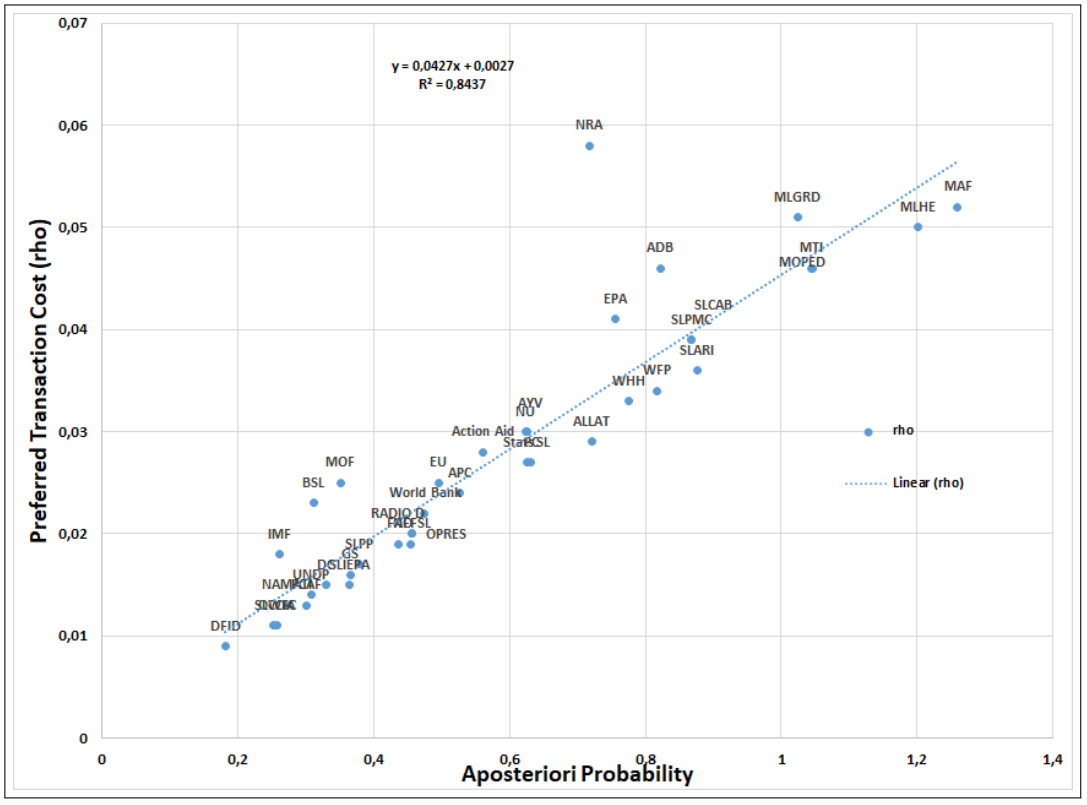
On the horizontal axis of the graph, the preferred transaction cost of stakeholder organisations in the land market is represented by ρ_g [8]. High estimates of the ρ parameter implies that a stakeholder prefers a high level of transaction cost in the land market and vice versa. On the vertical axis, the estimated parameter, λ_g, is reported. The latter corresponds to the Highest Posterior Density(HPB) estimator of stakeholders' belief about whether farmers hold myoptic price beliefs or rational expectation beliefs when engaging in land transfer transactions. Technically, λ_g is a probability measure that stakeholders assign to the state of world characterized by non-rational expectation equilibrium beliefs of farm-households.

Ranging from zero to one point four, on the one extreme, parameters close to zero indicate that stakeholder organisations hold the belief that farm households operate in a rational expectation equilibrium world, with an optimum transaction cost closer to zero. On the other extreme, parameters close to one point four illustrate that stakeholder organisations hold the belief that farm households operate in a non-rational expectation equilibrium world, with an optimum transaction cost closer to one [9].

[8] To facilitate interpretation, we normalized maximal simulated transaction costs to 1.

[9] While, as can been from figure 5.4, some stakeholder organizations have estimated lambda values that are larger than 1 and hence inconsistent with a probability measure, this could be corrected by explicitly constraining λ_g to be lower or equal to 1. We did this and estimated λ values resulted exactly to a maximum of 1. Estimated δ values were correspondingly higher implying a higher accountability to the voters for these organizations.

Figure 5.4: Welfare Effects of Transaction Cost Under Rational Expectation Equilibrium



Source: Own presentation of survey data.

Interestingly, our estimates demonstrate that there is a linear relationship between a stakeholder organisation's HBD-estimator and her preferred transaction cost. Consequently, the higher a stakeholder's belief that farm-households optimum transaction costs are farther away from the true equilibrium, the higher is her preferred transaction cost. This implies that organisation on, or closer to, the line are driven entirely by their beliefs, an indication that stakeholders preferred level of transaction costs are mainly based on their beliefs regarding FHs rationality about future price changes after land transfers. For instance, political agents at the top end of the linear graph hold the belief that farm households beliefs are myoptic, i.e, that farm-households' optimum transaction cost are farther away from the true equilibrium. Further, given that the overriding interest of stakeholder organisations, as shown in figure 5.1, is to maximize the welfare of farm households, they prefer high transaction costs to prevent the substantial transfer of land to large-scale farmers. Similarly, stakeholder organisations like DFID, who are located on the lower end of the line, are driven by the belief that farm households decisions are based on rational

expectation equilibrium. Accordingly, their preference is to maintain a very level of transaction costs that is closer to the true optimum equilibrium, which equates to zero.

5.5.3 Assessing Policy Failure in Land Market Politics of Sierra Leone: Land Grabbing or Mismatch of Beliefs?

In the preceding chapters of this thesis, both the economic and political systems were separately examined. However, in reality, both systems operate in consonant with each other. Thus, in this section, we simultaneously combine both the economic and political systems in our analysis. Since the choice of large-scale land acquisition policies is made by political agents, an examination of the underlying political incentives and policy beliefs will provide additional insights into understanding the factors that influence their decisions. Such an analysis is useful to answer the political economy question of whether the choice of land grabbing policies is driven by biased incentives or lack of political knowledge.

A first hint of whether land market policies in Sierra Leone are characterized by land grabbing preferences- that is, preferences that favour large-scale land transfers that enhance the profits of large-scale farmers and investors over the welfare of farm households- is illustrated by the results in figure 5.4. Based on our political-economy model, this will imply that politicians prefer low transaction costs although they believe that small-scale farmers hold myoptic price beliefs. Hence, a biased incentive driven policy in favour of large-scale farmers will be characterized by high λ-values and very low ρ-values. As can be seen from figure 5.4, our estimation do not reveal such a policy preference. There are, however, some stakeholders who are captured by large-scale farmers, i.e. they place an extremely high political weight on large-scale farm profits. These organisations, based on our survey result, would include the Ministry of Agriculture and Forestry (MAF), the Ministry of Lands Housing and the Environment (MLHE), the Ministry of Local Government, and Rural Development (MLGRD), together with the United Nations World Food Programme (WFP). (See for example their location in the policy space in the bottom plot of figure 5.1). However, overall even for these organizations, estimated preferred transaction cost levels are still driven by policy beliefs, as no clear outliers below the estimated line in figure 5.4 can be identified.

However, our results indicate that there are some outliers above the line. Driven entirely by their interests in maximizing urban welfare, these organisations prefer higher transaction costs than their estimated beliefs suggest. Prominent among them are the top experts and managers of the country's economy. They include the International Monetary Fund (IMF), the Ministry of Finance (MOF), the Central bank of Sierra Leone (BSL), the National Revenue Authority (NRA), the African Development Bank (ADB) and the Environmental Protection Agency (EPA). As can be seen from the lower plot in figure 5.1, they fall into the category of organisations that have a high interest in maximizing the welfare of urban consumers. As a result, they are driven by their political interests of keeping domestic food prices low and off-farm wages high. Hence, their preference would be to have higher levels of transaction costs in place to prevent rural farm-households from transferring land to large-scale farmers.

A Political Performance Measure of Sierra Leone's Land Reform Policies

Given that total welfare varies significantly with the level of transaction costs, it is interesting to quantitatively assess whether policy failure, if any exist, is due to biased beliefs or biased incentives. To do this within our political economy approach, we need a political decision-making model that transforms policy preferences of stakeholders into a final political decision. In this regard, we follow Henning and Hedtrich (2018) and Henning *et al.* (2019) who apply a modified legislative bargaining model of a Baron-Ferejohn type to derive final policy choices from a mean voter theorem. This model indicates that legislative bargaining in legislatures imply that final political policy is a result of a weighted mean of the legislatures' ideal policy preferences. Moreover, Henning and Hedtrich (2018) followed Grossman and Helpman (1996) and derived legislatures policy preferences from political support maximization activities including lobbying. In this approach, legislator's spatial policy preferences are a weighted sum of the corresponding policy preferences of voters and relevant interest groups. To this end, following Henning *et al.* (2019), final policy decision resulting from legislative bargaining, including lobbying, can be derived as a weighted mean of ideal points of all relevant stakeholders, i.e. involved governmental and legislative organizations as well as non-governmental organizations. Empirically, the weight of individual stakeholders can be estimated using generalized power indices calculated for political agents based on constitutional rules (Banzhaf, 1965), and policy network multipliers derived from collected policy network data (Stark, 2016).

To assess policy failure, we calculate the final policy decision applying the mean voter theorem. This is done by deriving stakeholders' preferred transaction costs under four counterfactual policy scenarios. First, under the "real scenario", we take estimated preferred transaction costs (ρ_g) as stakeholders policy positions. To define counterfactual scenarios, we assume that all stakeholders know exactly the true price beliefs of small-scale farmers, i.e. politicians know exactly if the latter hold myoptic or rational expectation beliefs. Moreover, we define social weights of rural and urban population as well as that of large-scale farmers, that correspond to a social welfare function. Hence, we can define the following three counterfactual scenarios:

+ + all stakeholders hold true policy beliefs and assign political weights corresponding to social welfare function.

+ - all stakeholders hold true policy beliefs but assign biased political weights as observed empirically.

- + stakeholders hold biased policy beliefs as estimated empirically, but assign political weights corresponding to social welfare function.

Logically, the real scenario just corresponds to the [–] scenario.

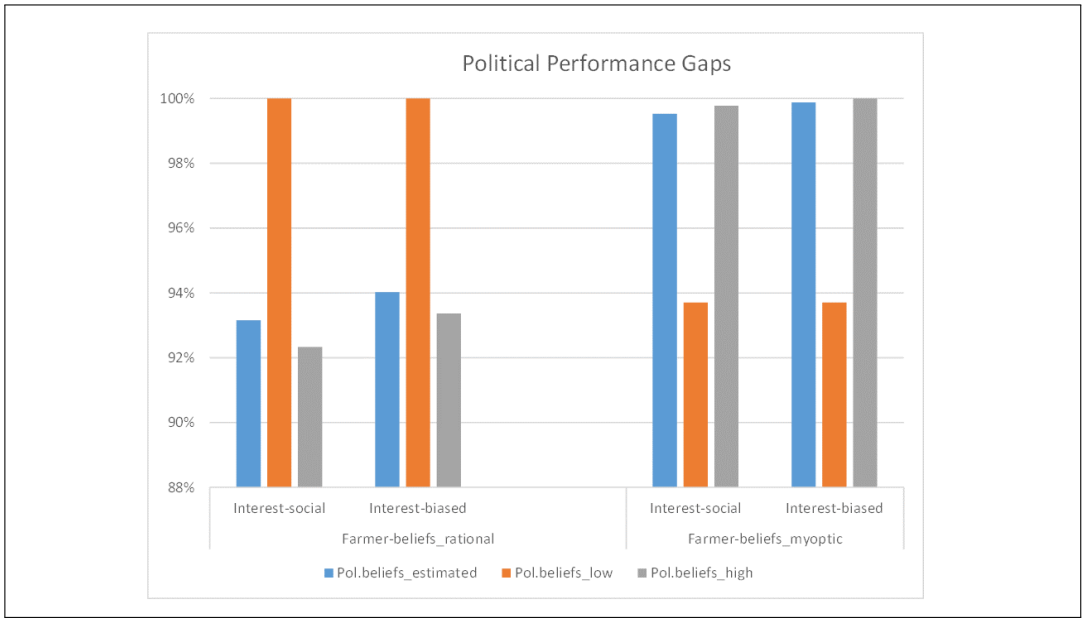
For each of the defined scenarios, we can derive the preferred transaction costs levels for all stakeholders from corresponding first-order conditions of political support maximization. Further, applying the mean voter theorem, we derive the final political decision, i.e. the transaction cost level that results from legislative bargaining of support maximizing political agents. Further, given our economic model, we translate transaction cost levels into the welfare of the urban and rural population as well as farm profits. Of course, for any given transaction cost level, resulting welfare levels depend on small-scale farmers price beliefs. Accordingly, we generate two welfare outcomes; one assuming the true state of the world that corresponds to myoptic price beliefs and another that assumes rational expectation beliefs.

Finally, we derive political performance comparing total welfare derived under the real scenario [–], with total welfare derived for the [++] scenario corresponding to unbiased policy beliefs and unbiased policy interests. Furthermore, we derive policy incentives gaps by comparing total welfare derived under the [+-] scenario, with total welfare derived for the [++] scenario. Additionally, we derive policy knowledge gaps by comparing total welfare derived under the [-+] scenario, with total welfare derived for the [++] scenario. Of course, as we do not know the true state of the world, we

calculate all gaps in two versions corresponding to myoptic and rational expectation beliefs respectively.

Calculated Performance gaps are reported in figure 5.5.

Figure 5.5: Political Performance Measured in Relative Total Welfare



Source: Own presentation of simulated data.

As can be seen from figure 5.5, land market policies would only be significantly inefficient if small-scale farmers would hold rational expectation beliefs. In this case, policy failure implies roughly a reduction in total welfare amounting to 6% of optimal welfare level that could be achieved assuming all stakeholders know that small-scale farmers have rational expectation beliefs and are social welfare maximizers. Moreover, incentives biases are generally almost negligible. i.e. comparing relative welfare levels achieved assuming bias and unbiased political interests reveal no differences. Interestingly, assuming that the true state of the world is characterized by myoptic price beliefs implies that if the majority of stakeholders would hold policy beliefs that farmers have rational expectation beliefs would vice-versa also imply significant welfare losses. The latter would, for example, result, if international donor organizations like IMF, UNDP, World Bank, DFID, the EU, FAO and AfDB would dominate the political decision-making process. Notably, donor dominance would mimic land grabbing preferences, although donor preferences for low transaction costs follow from policy based beliefs and not from biased policy incentives.

5.5.4 The Political Economy Factors that Influence the Choice of Land Reform Policies

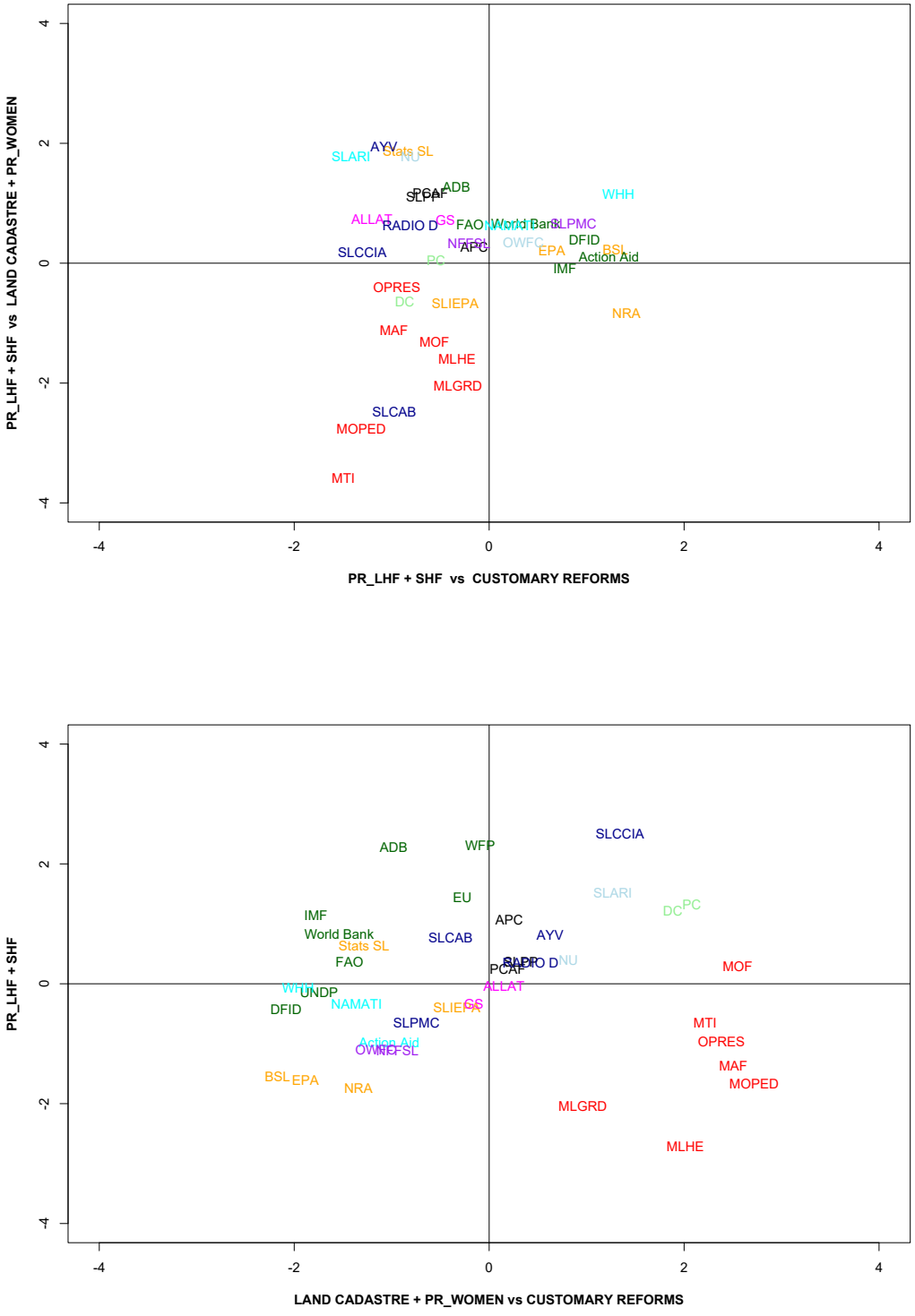
Finally, we contrast a political agents' estimated beliefs about the impacts of land market policy instruments [10] on reducing marginal transaction costs with the associated political costs of implementing such policy reforms [11]. Using a principal component analysis, both belief estimates are mapped into a two-dimensional policy space in figure 5.6. Through our principal component analysis, we are able to extract a lower number of unobserved, uncorrelated variables from observed, correlated variables. For the land reform policy instruments, the analysis predicts that the nine policy instruments can be summarized into three main reform priorities: Reforming land property rights of small-holder and large-scale farmers (PR_LHF + SHF), undertaking customary tenure reforms (CUSTOMARY REFORMS), and establishing a land cadastral system (LAND CADASTRE). Higher values denote that an actor holds the belief that such a policy reform has high impact on reducing transaction cost, as shown in the upper plot of figure 5.6, or has a high political cost, as shown in the lower plot of the same figure.

From these results, we observe that while the presidency and the various ministries of the central government (actors coloured in red) share similar technological beliefs that strengthening the property rights of small-holders and large-scale farmers have the most impact on reducing transaction cost, they estimate that customary tenure reform carries the highest political cost. This result confirms numerous studies that conclude that customary tenure reform have proven futile in the past because of central government's unwilling to confront local government authorities like paramount chiefs as a result of the perceived political cost associated with such reforms (Acemoglu *et al.*, 2014b; Johnson, 2011; Renner-Thomas, 2010; Unruh, 2008). Government's view about the political cost of customary reforms also clashes with the majority of the donors (coloured in green), who hold the belief that customary tenure reform will have the most impact in reducing transaction costs. Given that the donor community and the government are the two main players in the policy network (see section 2.5.3 for discussions about the influence of the various stakeholder groupings in the policy network), this might be a significant source of contention in the land reform policy process.

[10] The various land reform policy instruments are described in table 5.2

[11] Following Henning and Hedtrich (2018), the political costs of implementing policy reforms correspond to electoral response of voters based on the anticipated policy impacts of the reform. This, for instance, could be a loss in electoral support due to changes of the status quo or due to bureaucratic efforts required to change the status quo.

Figure 5.6: Estimated Beliefs about the Impact of Policy Reform Instrument in Reducing Transaction Cost (top) and the Political Cost of Implementing Reforms (bottom)



Source: Own presentation of survey data.

The other reform strategies, the establishment of a cadastral systems and strengthening the property rights of women, is supported by a diverse group of interest groups including Farmer Associations, Agricultural industries, Civil Society Organisations and the Media. The two major stakeholders in the policy space do not also seemingly hold the belief that undertaking such reforms have any significant political cost. Given that the existence of land cadastral system and strengthening the property rights of women have long been identified as very important factors in the functioning of land markets (Deininger and Jin, 2006; Deininger and Feder, 2001; Saleh, 2004; Deininger and Jin, 2006; Doss *et al.*, 2014), our results suggest that their implementation would meet less political resistance and at the same time make significant improvements that could encourage additional reforms in the future.

5.6 Conclusion

In this paper, we developed a farm household model that integrates imperfect land and labour market due to transaction costs to examine the underlying political incentives and policy beliefs that drive the political decision making process in the choice of land policies. Our theoretical framework allows for the transformation of policy incentives and implicit mental models of political agents into political incentives and policy beliefs, and the disentanglement of performance gaps into belief and incentive bias. We also used Bayesian estimation techniques to measure individual policy beliefs and the Baron-Ferejohn legislative bargaining model to quantitatively ascertain whether political performance gaps are as a result of biased incentives or beliefs.

First, our results indicate that political decision-makers in Sierra Leone's land policy domain have to contend with uncertainty about how policies translate into outcomes. Relying on subjective mental models, they form beliefs about how policies translate into outcomes. Our results also show that differences in subjective mental models among policy makers can result in the preference of different policy options. In our models for instance, on the one hand, the majority of the donor organisations prefer low transaction costs because of their belief that farm households hold rational expectation. On the other hand, the majority of the executive branch of government prefer high transaction costs in land markets because they believe that farm households hold myoptic beliefs. Given that this wide variance in policy beliefs, particularly between most in the donor community and the executive branch of government- two of the most powerful groups of stakeholders in the policy net-

work, could result in the choice of inefficient policies, we follow from Hedtrich (2019) and suggest a trans-disciplinary research approach that allows for the scientific and political community to interact and narrow these policy belief differences.

Another important conclusion that could be drawn from our study is that political agents who generally favour lowering transaction costs to facilitate the efficient allocation of land from small to large-scale farmers within Sierra Leone's land policy domain are not driven by a political incentive to protect the interest of large-scale land investors at the expense of the welfare of small-holder farmers as typically characterised in the general literature on land grabbing (see e.g. Edelman, 2013; Künnemann and Monsalve Suárez, 2013b; Daniel and Mittal, 2009; Mann and Bonanomi, 2017). Rather, we can infer that stakeholders' preferences for low or high transaction costs are in fact driven by their belief that small-holder farmers have myoptic beliefs. However, we do find stakeholder organisations who are driven entirely by their interests in maximizing urban welfare, even though their estimately policy beliefs suggest otherwise. Prominent among them are the top experts and managers of the country's economy. They include the International Monetary Fund (IMF), the Ministry of Finance (MOF), the Central bank of Sierra Leone (BSL), the National Revenue Authority (NRA), the African Development Bank (ADB) and the Environmental Protection Agency (EPA).

Notwithstanding the contribution our paper makes to the land grabbing literature, there is one limitation that warrants mentioning. We acknowledge that our proxies for transaction costs, the land reform policies, do not completely represent the true transaction costs in the Sierra Leone land market. Thus, our results are a mere indication of the impact transaction costs can have on society's welfare. In addition to land laws and policies, other important considerations such as access to markets, levels of uncertainty and moral hazard may also be important determinants of transaction costs in the study area (Key *et al.*, 2000; Holloway *et al.*, 2000). While consideration of additional factors that increases transaction costs might add to the robustness of future findings, the empirical findings of this paper still contributes to our understanding of the effects of policy beliefs and incentives on the choice of inefficient land reform policies.

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Chapter 6
Conclusion and Outlook

The recent surge in the large-scale acquisition of land has garnered a lot of attention within local and international development corridors as well as in academic circles. The growing literature on this topic has focused on a range of issues including the sheer scale and size of these investments (BBC, 2012; Edelman, 2013; Oya, 2013), their gender dimensions (Doss *et al.*, 2014; Arndt *et al.*, 2010; Ryan, 2018; Daley, 2011) their drivers and effects on local communities (Kleemann and Thiele, 2015; von Braun and Meinzen-Dick, 2009; Mann and Bonanomi, 2017). However, with the exception of few studies (Krieger and Leroch, 2016; Lavers, 2012; Scurrah *et al.*, 2015; Cotula, 2012), very little consideration has been given to the political economy processes that result in the choice of these policies. This is despite the fact that large-scale land acquisition processes are inherently a political issue defined by social, economic and political dimensions of power. Also, since the choice and implementation of large-scale land acquisition policies are driven by multiple stakeholders who wield different powers and have diverse interests, it underscores the importance of examining the political processes that result in the adoption of these policies (Wolford *et al.*, 2013; Cotula, 2012; Margulis *et al.*, 2013). Additionally, given that the acquisitions have been even more prominent in regions where imperfect factor markets have long been identified as barriers to productivity (De Schutter, 2011; Anseeuw *et al.*, 2012; The Land Matrix Global Observatory, 2016), the absence of quantitative evidence about the effects of markets imperfections, first on land transfers, but more importantly on the welfare implications, warrants special attention.

This thesis makes a couple of important contributions to the large-scale land acquisition literature. Firstly, it adopts a Computable General Political Economy (CGPE) modelling approach to quantitatively analyse the political decision making and policy learning process that results in the choice of large-scale land acquisition policies. To this end, our model choice allows for a comprehensive political economy analysis of land acquisition policies and the measurement of, among others, the endogenous formation of preferences and policy beliefs of key stakeholders in the policy for-

mulation process (Henning and Hedtrich, 2018). Furthermore, rather than assume perfect rationality of political choices, the thesis employs an innovative methodology to empirically estimate the role of policy beliefs and political incentives in the policy process. Also, through the application of an integrated micro-macroeconomic modelling framework, it examines the household and country-wide welfare effects of large-scale land acquisitions in Sierra Leone, and provides policy makers with additional empirical evidence about the mechanisms through which large-scale land acquisition contributes to economic growth and poverty reduction. Lastly, through a political diagnosis analysis, we empirically identify why land grabbing policies have failed to achieve their desired objectives (political performance gaps). In this chapter, we summarize the main findings of our studies, highlight some of its limitations, and provide an outlook for future research.

6.1 Chapter Summaries

6.1.1 An Assessment of Land Reform Policy Processes in Sierra Leone: A Network-Based Approach

In chapter 2, we evaluate the land policy formulation process by examining the role of policy beliefs and policy networks in the choice of land reform policies. Specifically, the paper disentangles the impact of policy beliefs, formal and informal political institutions, and political power on the choice of large-scale land acquisition reform policies. At the methodological level, an empirical specification of the communication network, defined over the set of relevant governmental and nongovernmental agents, is undertaken using a belief updating model. We also empirically derive the political decision-making power from constitutional rules through the application of the concept of generalized power indices (see Henning and Hedtrich, 2018). Our findings show that the exchange of expert information within Sierra Leone's land and agricultural policy network is structured and that exchange of expert information results in political agents giving up some of their decision-making power to non-political actors like donors to influence final policy choice. While changes in policy beliefs after communications are not substantial, they are large enough to facilitate consensus in the policy-making process.

We acknowledge that there are some limitations to our results. Whereas our belief formation model is flexible enough to quantify organizational learning that occurs

in policy networks through the measurement of weight organisations place on the policy belief of others, we find the assumption that actors put equal weight on all information they receive from others unrealistic. Additionally, it could well be the case that donors and the executive branch of government have a more pronounced influence in the policy making process because they outnumber other organisation by at least a ratio of 2 to 1. This over representation needs be taken into consideration in subsequent network studies. Furthermore, given the role of biased voter beliefs in influencing the policy beliefs of politicians (see Bischoff and Siemers., 2011; Caplan, 2007), we suggest that future political economy research focus on understanding the extent to which voter behaviours also drive the choice of large-scale land acquisition processes.

6.1.2 An Exponential Random Graph Modelling Approach to Assessing Lobbying and Political Power in Sierra Leone

This study builds on the preceding chapter and applies the Exponential Random Graph Modelling approach to estimate the network generating process (Henning *et al.*, 2019; Snijders, 2002). It also estimates the communication and political support network and then uses these estimates to derive the dyadic network multipliers. These are in turn used in the belief-formation model to simulate belief-updating, through the application of the Friedkin model (Friedkin and Johnsen, 1990). This approach allows for not only the identification of determinants of the structure of policy networks, but also the identification of possible strategies for designing network structures that imply more efficient policy processes. In addition to structural variables, our econometric model also measures the extent to which the emergence of policy networks is determined by organisational attributes such as perceived influence or reputation of an organization, organizational expertise, receptiveness to external knowledge, policy and preference homophily and belonging to the same organizational type. The results reveal that policy networks are not entirely driven by political agents need for information to form and update their policy beliefs, but also by personal organizational attributes, policy preferences and beliefs, and network structures. Furthermore, our analysis suggests that organizations predominantly rely on one another to determine the trust worthiness of an information source and the reliability of providers of political support. This underscores the importance of transaction costs in determining the emergence of networks in Sierra

Leone's land policy domain.

Our results also demonstrate that policy networks are "more than just metaphors" (Pappi and Henning, 1998). This is so because, by integrating non-state actors into the political decision-making process, they increase their influence in the policy making process through their influence on policy beliefs. Also, our methodological framework allows us to identify and measure the importance of stakeholder engagements and information diffusion in policy networks. Future research is however needed to ascertain whether final policy choices that results from stakeholder engagements in networks have any positive welfare impact on society.

In this paper, following from Henning *et al.* (2019) and Leifeld and Schneider (2012), we distinguished between the two types of political communication in our policy networks: communication ties and political support ties. For future research, it will be interesting to explore whether ties linked to different political support and communication relationships exhibit similar patterns of network properties like network density, size, reachability, and the average strength of ties. Additionally, it could well be the case that informational exchanges and political support relationships in policy networks are also driven by organisational culture, and leadership styles. To this end, future research about the role of organisational culture and leadership in determining exchange relationships would be promising. This could also increase our understanding of the connection between institutional and structural variables and leadership and cultural patterns in the policy formulation process. Thus, longitudinal research designs that collect data on leadership and cultural styles could further our understanding of the effect of specific leadership and cultural patterns on exchange relationships and policy choices.

6.1.3 Land Market Imperfections and Large-Scale Land Acquisition in Sierra Leone: A Computable General Equilibrium (CGE) Analysis

This chapter provides an empirical estimation of the impact of imperfect land and labour markets, and the resulting transaction costs, on land transfers in Sierra Leone. It explores both its macro effect on sectoral and GDP growth and its welfare effects across different households in the economy. The main simulation results suggest that policies that moderately reduce transaction costs have the potential to increase GDP and reduce poverty both at the economy-wide and household level.

While our model attempts to address an existing gap in the literature, there are several areas for future research. To begin with, in our model, no consideration is given to the use of other local resources like water by large-scale land investors and the effects it could have on the productivity and welfare of small-holder farmers and other community members. Additionally, our model does not account for spill-over effects that might arise from knowledge transfers, construction of local infrastructures like roads and schools by investors in their operational areas. Finally, the significance of unused and fallow land, particularly in a country like Sierra Leone, where slash and burn are the main source of land conversion, should be considered in future studies in the context of land availability for acquisition by large-scale investors. For instance, a study carried out by the German Ministry of Economic Development in Sierra Leone concluded that Sierra Leone is presently over cropped and that the present conversion method of slash and burn does not allow for a sufficient time frame (assumed to be 30 years) for the soil fertility and vegetation to sufficiently recover (Bald and Schröder, 2012). It is likely that a more efficient and environmentally friendly mode of land conversion could substantially increase the amount of land available for acquisition and reduce the amount of competition for land between small-holder farmers and large-scale investors.

6.1.4 Land Grabbing in Sierra Leone: Government Capture or a Mismatch of Beliefs?

This chapter builds on the preceding three chapters and examines the political processes within which large-scale land acquisition occur. Unlike the previous papers where the economic and political systems within which large-scale land acquisition occurred are separately investigated, this paper combines the two systems to examine whether political agents prefer large-scale land acquisition policies because they believe it will promote technical progress and growth in the economy, or because they are captured by particular interest groups of foreign investors or local large-scale farmers. First, an extended Farm Household Model (FHM) that incorporates perfect, imperfect, and totally missing labour markets is used to estimate the welfare effects of transaction costs on farm households and large-scale farmers. Second, a Bayesian estimation technique is applied to estimate the relevant components of the political decision-making framework, individual policy beliefs, as well as the political influence of stakeholders.

Through the application of this modelling and estimation framework, the paper's

main contributions to the political economy of land-grabbing are: the empirical estimation of the technological transformation process, an enhancement of our understanding of the political decision making process, and the disentanglement of the reasons behind the persistent failure of land reform policies in the context of large-scale land acquisition. In sum, the empirical findings of the chapter underscore the importance of policy beliefs and political incentives in the political decision making process. A possible area of future research will be to build on our estimation of the political cost of undertaking policy reforms by quantifying voters' beliefs regarding the political technology of the land policy instruments in Sierra Leone. To contribute to the development of responses to the identified policy failures in the case of Sierra Leone, future studies can also enhance our understanding of the political decision making process by modelling the endogenous formation of legislator's political preferences and policy learning processes.

6.2 Policy Implications and Outlook

An evaluation of the political decision-making process that results in the choice of large-scale land acquisition policies as well as the examination of the economic impacts of imperfect land and labour markets and the resulting effects on growth, disposable income and levels of poverty are certainly important topics which this dissertation contributes to. In particular, our theoretical framework, the Computable General Political Economy Model, allows for a comprehensive examination of the economic, political, and institutional factors that drive large-scale land acquisition policy processes in Sierra Leone. As opposed to other political economy models that overwhelmingly focus on biased incentives as the main driver of inefficient policies, our model considers the absence of policy expertise as one of the primary sources of the choice of inefficient policies.

Articles in this dissertation have attempted to highlight the primary mechanisms that drive policy choices in the land and agricultural policy network in our study area. Among others, this thesis concludes that political actor's need to update their political knowledge about specific policies and garner political support to implement policy preferences are important drivers of the policy formulation process. Policy incentives, preferences and structural factors like the pre-existence of previous exchange relationships, mutuality, transitivity and multiplexity also play an important role in the policy formulation processes. Communications within policy networks do not only increase knowledge about how policies translate into outcomes, it also builds consensus among actors who hold different policy beliefs. This conclusion is consistent with findings of Sabatier and Jenkins-Smith (1993), Dowding (1995) and Jacoby (2006) who similarly conclude that policy choices and reforms are more likely be productive and yield fruit when it is inclusive. Our economic analysis are in line with other empirical analysis which similarly conclude that policy reforms which eliminate laws and policies that results in high transaction costs in land and labour markets enhance productivity, and increase the levels of income of small-farming households (Deininger and Feder, 2001; Deininger, 2003; Ciaian and Swinnen, 2006; Besley and Ghatak, 2010; Saleh, 2004).

These findings have significant implications for development institutions and donor organisations seeking to promote stakeholder engagement and bolster evidence-based policy processes in developing countries like Sierra Leone. We have attempted to demonstrate that development organisations who want to influence policy changes will need to leverage on their exchange relationships with political actors or influ-

ential brokers that are embedded in policy networks to influence policy reforms. To this end, donor organisations are often right to form coalitions with the executive branch of government to achieve policy reforms. Such coalitions are indeed instrumental in influencing policy change through the exchange of expert information and political support (Mockshell and Birner, 2015; Leifeld and Schneider, 2012; Henning *et al.*, 2019). However, at the same time, because real political influence resides in the hands of few players in these political systems, there is a risk that the subsequent bottom-up policy driven formulation processes will result in the desired policy priorities of less influential groups being completely ignored. Thus, conscious efforts must be made to ensure that including less powerful groups in the policy making process is not seen as a "window dressing" exercise, but to ensure that their voices and policy priorities are given due consideration. To this end, the broader issue of how to engage all stakeholders in a political system where power resides in the hands of few people remains an open question.

However, a number of questions about the political economy of large-scale land acquisition remain unexplored. First, since most countries in SSA where large-scale land acquisition is prevalent have some form of democratically elected governments, a comprehensive political economy analysis should incorporate an examination of the electoral response of voters to major policy options like the adoption of these policies. Studies elsewhere indicate that voters behaviour significantly influences the incentives of politicians to implement policies that either serve the interest of the general populace or special interest group (Henning *et al.*, 2018). Accordingly, a further examination of whether the electoral responses of voters in Sierra Leone are based on policy oriented or non-policy-oriented motives will further enrich our understanding of whether elected politicians are driven by the political incentive to implement policies preferred by the majority or not.

The dissertation also attempted to examine how different constitutional set-ups and informal power structures determine final policy choice in chapter 2 and 3. In chapter 4, we also set out to examine the effect of transaction costs an ecological-economic system. Given that different constitutional set-ups imply different level of political transaction costs, that is, the cost involved in making political decisions (See Dixit (1998)), additional research about the extent to which political transaction costs resulting from political exchange among political agents affect the choice of efficient policies is required. Such a study would help further clarify the role of informational exchange and voters behaviour in the choice of reform policies like large-scale land acquisition in Sierra Leone and elsewhere.

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Appendix A

Complement to Methodological Sections

In chapter 2 the mean voter model, which comprises a belief formation model and a legislative bargaining model, are used, while chapter 3 employs both a belief formation model and an Exponential Random Graph Model (ERGM). In chapter 4, a CGE Modelling framework is used. In this section, we describe these methods.

A.1 Complement to chapter 2

A.1.1 Political Belief Formation Model

To examine practical political decision-making in Sierra Leone's agricultural and land policy ecosystem, the starting point is to understand how political actors form their political beliefs. To this end, a model of naive political belief formation where agents use observed policy outcomes as well as political positions communicated by other political agents, to up-date their political beliefs is used. To illustrate how naive policy learning in political communication networks works we begin with belief formation regarding the political technology.

Let E denote the set of elite members, where the set N of political agents is a subset of the set E. Beyond political agents a subset of non-governmental actors, e.g. representatives of stakeholders who by the constitution are not involved in legislative decision-making. We denote $i, j \in E$ a generic element of the political elite.

We start by assuming that the true political technology of how policies translate into outcomes is linear. Let the matrix A denotes the true political technology, i.e. $z = A\alpha$.

Let $\tilde{A}_i$ denote a simple linear political technology believed by a elite member, then her policy preferences $u(\alpha)$ result from the following support maximization:

$$u_i(\alpha) = Max \left\{ S_i(z) |\, z = \tilde{A}_i \alpha \right\}$$

Assume further actors observe policy outcomes implied by a policy α, $z(\alpha)$. Obviously, these observations are informative regarding the true political technology. However, individual observations are noisy, e.g.:

$$z_i^b = A\alpha + \varepsilon_i$$

where ε_i denotes an idiosyncratic error term, with $E(\varepsilon_i) = 0$.

To consider communication structures we define a binary network T^1, where $T_{ij}^1 = 1$ indicates that agent i and agent j have an established communication tie. Accordingly, we define the subset $E_i = \left\{ i \in E, T_{ij}^1 = 1 \right\}$ as the neighbourhood of agent i, where it holds:

$$\sum_{j \in E_i} t_{ij} = 1 \quad t_{ij} = \frac{T_{ij}^1}{\sum\limits_{j' \in E_i} T_{ij'}^1}$$

Accordingly, $T = [t_{ij}]$ denotes the communication network, where $t_{ij} > 0$ indicates that actor i pays attention to actor j. T is a stochastic matrix, i.e. for each actor the sum of total weights equals 1.

Within one period a political communication process occurs, where elite members repeatedly update their political opinion via taking weighted averages of their neighbours' beliefs with t_{ij} being the weight or trust that actor i places on the current belief of agent j in forming his or her belief for the next period (see also Jackson (2008). Let $r = 1, .., R$ denote the communication round then it follows:

$$Y_i^{r+1} = t_{ii} Y_i^0 + \sum_{j \neq i} t_{ij} Y_j^r \tag{A.1}$$

Moreover, the initial belief Y_j^0 just follows from the actor's belief regarding the political technology:

$$Y_j^o = \underset{\alpha}{argmax} \; S_j(z) \quad s.t. \quad z = \tilde{A}_j \alpha \tag{A.2}$$

Rewriting equation A.2 results:

$$\begin{array}{l} Y_i^{r+1} = t_{ii} Y_i^0 + (1 - t_{ii}) \cdot \sum_j \hat{t}_{ij} Y_j^r \\ with : \hat{t}_{ij} = \frac{t_i j}{(1 - t_{ii})} \end{array} \tag{A.3}$$

where Y_i^r is the opinion of agent i resulting after r communication rounds, and Y_i^0 denotes agent i's initial opinion before communication.

Actors form their initial opinion via Nerlove up-dating after they have received the

private signals. The parameter t_{ii} represents the weight for their own opinion. As T is row normalized to one, $(1 - t_{ii})$ is the aggregated weight for all neighbors, i.e. the influence or communication field of other agents.

Writing equation (A.3) in matrix notation and after further rearrangements results:

$$y = \left[I - (1 - t_{diag})\,\hat{T}\right]^{-1} \cdot t_{diag} \cdot y^0 \tag{A.4}$$

with $M = \left[I - (1 - w_{diag})\,\hat{C}\right]^{-1} t_{diag}$ being the network multiplier which is similar to the Hubbell index (Hubbell, 1965).

The belief up-dating in eq. A.4 is similar, but still differs from the DeGroot model analyzed by Jackson (2008). In particular, note that for any row stochastic matrix $\hat{T}$ belief formation converge to a well-defined limit y corresponding to the belief vector of actors reached after communication. Accordingly, the limit opinion of each agent after communication results as a weighted average of the initial opinion of all agents before communication (y^0), where the weight of agent j's initial opinion (Y_j^o) for agent i's opinion after communication (Y_i) just equals the element M_{ij} of the multiplier matrix M. Thus, the multiplier defines the field strength of agent j's initial opinion operating on agent i's final opinion. Note that the multiplier includes all communication loops among actors, i.e. all direct and all indirect effects of j's initial opinion on the opinion of agent i resulting from communication.

A.1.2 Legislative Bargaining Model

Our mean voter rule model used in chapter 2 uses a legislative bargaining framework to model the legislative decision making process in Sierra Leone. Based on Baron and Ferejohn (1989), we assume a legislature to constitute a set N of n legislators, where $l = 1, ..., n$ denotes the index of legislator l, and a constitutionally fixed majority voting rule φ. A legislator has to choose collectively a policy α out of a compact and convex subset R^m of the m-dimensional cube $(0, 1)^m$. Each legislator $l \in N$ has a complete, transitive binary preference relation defined for all $\alpha, \alpha' \in R^m$, that is represented by a concave utility function $U_l(\alpha)$. Formally, the rule φ corresponds to a binary choice procedure, which determines legislature choice among two alternatives α and α'.

If s denotes the status-quo policy, a necessary condition for a change of the status-quo policy is the existence of a winning coalition g whose members uniquely prefer an alternative to the status quo SQ. Let $W(SQ) \subseteq R^m$ denote the subset of alternatives α, for which a winning coalition exists that prefers α to SQ. A general characteristic of legislative decision-making is that W(s) is generally a large subset of R^m and there exists a large number of different winning coalitions preferring different alternatives to the status quo. Moreover, constitutional rules neither determine which winning coalition has to form nor which element of W(SQ) has to be proposed.

In this context Baron and Ferejohn (1989) model legislature's choice of a policy $\alpha \in R^m$ as an infinite horizon non-cooperative bargaining game among legislators determined by the following rules. At the first stage an individual legislator, $l \in N_L$, is selected according to the randomized recognition rule to propose a policy, and at a second stage all legislators vote on the made proposal. If the proposed policy received sufficient votes, i.e., a winning coalition forms for the proposal, this proposal is the new policy. Otherwise, a new legislator is selected and the procedure starts from the beginning. Assuming individual preferences are common knowledge, Baron and Ferejohn (1989); Austen-Smith and Banks (1998) have shown that the non-cooperative bargaining game has a stationary subgame perfect Nash equilibrium even for multidimensional policies and multiple legislators, i.e., m,n > 1.

Since humans have limited mental capacities, we assume that legislators do not perfectly know spatial preferences of all other legislators in a multi-dimensional policy space. In contrast, to deal with imperfect information, legislators simplify real world phenomena, i.e., apply low-dimensional ideological spaces to approximate legislators true preferences. Based on the ideological approximation of the true policy space, legislators are able to anticipate other legislators' response to policy proposals. To include imperfect knowledge of other legislators' preferences, we suggest a modified legislative bargaining game via relaxing the assumption of noise-free perfect rational behaviour of legislators (Henning *et al.*, 2019).

Given the noise of legislators' choices at the voting stages as well as due to the random recognition rule, policy outcome is uncertain ex-ante. Therefore, as long as it is assumed that legislators are risk averse, policy outcome is inefficient; i.e., certain policy outcomes, which are commonly preferred by all legislators, always exist. Thus, legislators have incentives to agree on informal decision making procedures if these informal procedures lead *ex-ante* to more efficient outcome. Following Shepsle and Weingast (1987), Henning (2000), a mean voter decision rule as a self-enforcing informal procedure of legislative decision-making is derived in the shadow of the uncertain outcome of non-cooperative legislative bargaining. According to the mean voter decision rule, legislators directly formulate a common proposal, which corresponds to the weighted mean of legislator's policy proposals, where the weights of individual proposals equal legislators' ex-ante probabilities that their proposals will be the final outcome of the formal non-cooperative decision making procedure. Thus, formally the mean voter decision rule is defined as:

$$\alpha^m = \sum_k C_k x^k \tag{A.5}$$

Given the concavity of legislators' utility functions, it follows directly that the mean voter decision rule implies for every legislator a higher *ex-ante* expected utility when compared to the non-cooperative outcome of the modified Baron-Ferejohn legislative bargaining game. Hence, the mean voter decision rule is self-enforcing.

Finally, assuming perfect uncertainty regarding the preferences of other legislators implies that for any proposal x_k the expected probability that other legislators will

vote in favour of this proposal equals 0.5. Under this assumption, the mean voter decision rule simplifies as follows ((Henning and Michalek, 2008):

$$\alpha^m = \sum_g C_g Y^g \tag{A.6}$$

with:

$$C_g = \frac{n_g}{\sum_k n_k} \tag{A.7}$$

,where n_g is the number of winning coalitions of which agent g is a member and Y^g denotes the prefered policy position of agent g.

Furthermore, it holds for Y^g:

$$Y^g = argmax U_g(\alpha) \tag{A.8}$$

In contrast to the Baron-Ferejohn model, one of the main advantages of such a cooperative legislative bargaining model is that it can be directly applied empirically to real political systems including multiple heterogeneous actors and multi-dimensional policy decisions.

A.2 Complement to chapter 3

A.2.1 Exponential Random Graph Models

Analysis in chapters 2 and 3, are based on social network data, a class of dataset that examine the social relations between agents in a bid to understand the establishment and generation of networks based on the relationships within these social arrangements and structures. However, since social network analysis relies on dependency among network ties, standard statistical methods are generally not suitable analytical tools (Butts, 2008). Exponential Random Graph Models (ERGM), first introduced by Wasserman (1996) and further developed by Snijders (2002) are node-based models that are well suited to model endogenous interdependencies like reciprocity or triangulation within networks, as well as the factors that drive the network generating process based on *a priori* defined set of network statistics. These network statistics are sub-graphs defining specific patterns of social behaviour that allows for the analysis of endogenous self-organization within social networks.

Let y represent an $n \times n$ directed adjacency matrix on a set of n nodes. Then, $y_{i,j} = 1$ if actor i sends a directed tie to actor j. Otherwise, $y_{i,j} = 0$. As y is a digraph and $y_{i,j} \neq y_{j,i}$ results in an asymmetric adjacency matrix. Since self-ties are not allowed, the diagonal of y is always empty. The $\mathcal{Y}$ is the set of all possible graphs on a fixed set of n nodes. Further, let X be an $n \times n \times q$ array of exogenous covariates like the preference similarity of two nodes (a dyadic attribute) or the type of an organization (a nodal attribute).

Here, $s(X, y) = (s_1(X, y), \ldots, s_p(X, y))'$ is a known vector of $p = r + q$ sufficient network statistics that may contain r endogenous configurations of network self organization and q exogenous covariates. The r endogenous sufficient statistics are network counts for directed sub-graph configurations like multiple triangles, two-paths or star configurations; see also Robins *et al.* (2007) for a detailed introduction to the ERGM framework.

The probability density function of an ERGM can be formulated as

$$\Pr(y|X) = \frac{\exp\{\theta s(X, y)\}}{\sum_{\tilde{y}\in\mathcal{Y}} \exp\{\theta s(X, \tilde{y})\}}, \tag{A.9}$$

where $\theta = (\theta_1, \ldots, \theta_p)$.

The normalizing constant $\sum_{\tilde{y}\in\mathcal{Y}} \exp\{\theta s(X, \tilde{y})\}$ ensures that Eq. (A.9) is a probability distribution and requires summation over all possible network realizations in $\mathcal{Y}$.

As a result of the high number of possible realizations in $\mathcal{Y}$, the normalizing constant is intractable even for networks of moderate size (ref Henning), making parameter

estimation challenging within the ERGM framework. To surmount this problem, Snijders (2002) and Hunter *et al.* (2008) suggest an analytical evaluation of the normalizing constant using a Bayesian estimation based on the Markov Chain Monte Carlo (MCMC) approach.

Thus, following Goodreau *et al.* (2009); Cranmer and Desmarais (2011), rewriting equation A.9 as as conditional logit becomes:

$$\ln\left[\frac{\Pr(y_{ij}=1, Y_{ij}^{C}|X)}{\Pr(y_{ij}=0, Y_{ij}^{C}|X)}\right] = \theta\delta(y_{ij}, Y_{ij}^{C}, X). \tag{A.10}$$

Here, Y_{ij}^{C} represents all dyads other than y_{ij}. Moreover, we label the vector of changes in the sufficient statistics when y_{ij} changes from 0 to 1 with $\delta(y_{ij}, Y_{ij}^{C}, X)$ so that,

$$\begin{aligned}\Pr(y_{ij}=1|Y_{ij}^{C}, X) &= \frac{\Pr(y_{ij}=1, Y_{ij}^{C}|X)}{\Pr(y_{ij}=0, Y_{ij}^{C}|X)+\Pr(y_{ij}=1, Y_{ij}^{C}|X)} \\ &= \frac{\exp\{\theta\delta(y_{ij}, Y_{ij}^{C}, X)\}}{1+\exp\{\theta\delta(y_{ij}, Y_{ij}^{C}, X)\}}.\end{aligned} \tag{A.11}$$

As one of our principal interests is measuring the relative importance of our various endogenous and exogenous variables, we quantify the effects on the probability given in A.11 that are derived from changes in $\delta(y_{ij}, Y_{ij}^{C}, X)$. Corresponding marginal effects are calculated by

$$\frac{\partial\Pr(y_{ij}=1|Y_{ij}^{C}, X)}{\partial\delta(y_{ij}, Y_{ij}^{C}, X)} = \Pr(y_{ij}=1|Y_{ij}^{C}, X)(1-\Pr(y_{ij}=1|Y_{ij}^{C}, X))\theta. \tag{A.12}$$

Since the individual marginal effects are locally defined, they are a function of all endogenous and exogenous network statistics because they are also partial derivates at a specific point in time (Henning *et al.*, 2019).

A.3 Complement to chapter 4

In chapter 4, we use a computational modelling framework that integrates a land and labour market model and a microsimulation poverty module into a Computable General Equilibrium (CGE) model to estimate the impact of land policy reforms on economic growth and household income and poverty levels. While CGE models are generally suited to measure macro and price effects of policy reforms, they are criticised for their inability to measure to distributional impact of policies (Cockburn *et al.*, 2008). Micro simulation models on the other hand are apt for measuring the household and distributive effects of policies but not suited to measure general equilibrium effects. A combination of these two modelling frameworks are in response to the need of policy makers to undertaken rigorous analysis that adequately examines the impact of policy reforms at both the macro level and individual and household level.

Since land reform policies significantly change micro economic behaviours like land demanded and supplied and levels of consumption and spending, up to a scale that results in general equilibrium effects, we employ an iterative version of the bottom-up top-down approach suggested by Tiberti *et al.* (2018). Our land market module is first used to measure the effects of transaction costs on land transfers. The simulated feed backs are then fed into the CGE model to estimate the resulting general equilibrium effects of land transfers. The factor and prices change from the CGE are then fed back and forth, in an iterative process, first, to estimate the impacts of land exchanges on economic growth and sectoral changes, and then its distributive effects on poverty and welfare (Cockburn *et al.*, 2014). This method is generally referred to as an accounting approach because it does not consider behavioural reactions to changes in factor prices. Instead, the focus is entirely on measuring the short-term responses to these shocks before any behavioural adjustments are measured.

The main sources of data for our model are an up to date Social Accounting Matrix (SAM), a survey dataset that captures expenditure at household and individual levels, and income and price elasticities, either from the country in question or other countries with similar macro-economic structures. Once the data requirements are met, households in the micro simulation data base must be mapped to similar representative households in the SAM based on levels of expenditures.

A.3.1 Land market module

One of the main hypothesis of our model is that the land market is specific to each type of farmer and that producers minimize their cost of production subject to a constant Elasticity of substitution Production function shown in equation A.3.1

$$Y_f = \delta_f . \sum_f (\mu_{fb,f}) . (QDF_{fb,f})^{-\rho_f} \tag{A.13}$$

Transaction costs in land markets are assumed to increase land price for buyers as specified in equation A.14:

$$B1_f - B - p\_alpha0_f - 2p\_alpha1_f * TDland_f = 0 \tag{A.14}$$

Finally, we assume that total land supply is fixed and fully respects a market clearance depicted in equations A.15 and A.16.

$$XL_f + TDland_f = QDF_{f,"lann"} \tag{A.15}$$

$$\sum_f (TDland_f) = 0 \tag{A.16}$$

Where

XL_f	Total land supplied to farmtype f
$TDland_f$	Traded land by farm type
$QDF_{fb,f}$	Farm type f demand for factors of production
$B1_f$	Price of factor including transactions costs
B	Equilibrium land price
p_alpha	Transaction cost
Y_f	Produced output by farm type
$\mu_{fb,f}$	CES-share parameter
ρ_f	CES-elasticitiy parameter
δ_f	CES-productivity constant

A.3.2 Exter Model

The main components of our CGE model are based on the Exter model developed by Decaluwé *et al.* (2001). Its main assumptions are that production activities of sectors *(XS)* are undertaken using fixed shares of value added *(VA)* and intermediate inputs derived from our Social Accounting Matrix. The combination of Value Added shares between composite labour *(LD)* and Capital *(KD)* is detrmined by a Leontief production technology. Production cost is minimized subject to a Constant Elasticity of Substitution (CES) production function from which optimal labour demand equations are derived.

Producers are assumed to maximise profit by utilizing quantities of production factors up to a point where marginal revenue is equal to prices. The structure of production is nested such that at the top and second level, the CES and Leontief production functions are used to derive optimal quantities of value added *(QVA)* and aggregate intermediate inputs *(QINTA)* respectively. The former is a CES function of factors QF_f, and the latter a Leontief of disaggregated intermediate inputs *QINT* as shown from equations A.17 to A.21.

$$QA_a = \alpha_a^a \left(\sum_{f \in F} \alpha_a^a . (QVA_a)^{-\rho_a{}^{va}} + (1 - \delta_a^a) . (QINTA_a)^{-\rho_a{}^{va}} \right)^{-\frac{1}{\rho_a^{va}}} \tag{A.17}$$

$$\frac{QVA_a}{QINTA_a} = \left(\frac{PINTA_a}{PVA_a} . \frac{\delta_c^a}{1 - \delta_c^a} \right)^{. \frac{1}{\rho_a^a + 1}} \tag{A.18}$$

$$QVA_a = \alpha_a^{va} \left(\sum_{f \in F} \alpha_{fa}^a . (QF_{fa})^{-\rho_a{}^{va}} \right)^{-\frac{1}{\rho_a^{va}}} . \delta_{fa}^{va} . (QF_{fa})^{-\rho_a{}^{va}+1} \tag{A.19}$$

$$W_f . WFDIST_{fa} = PVA_a . (1 - tva_a) . QVA_a \left(\sum_{f \in F} \delta_{fa}^{va} . (QF_{fa})^{-\rho_a{}^{va}} \right)^{-1} \tag{A.20}$$

$$QINTA_{ca} = ica_{ca} . QINTA_a \tag{A.21}$$

Additionally, the Sierra Leonean economy is also modelled as a small open economy where world market prices for imports and exports are fixed exogenously. Accordingly, based on Armington (1969) , we use the Constant Elasticity of Transformation (CET) function, shown in equations A.22, A.23, and A.24 to model time and quality

related differences between exported and domestic products in the Sierra Leonean economy.

$$QX_c = \alpha_c^t.\left(\delta_c^t.{QE_c}^{\rho_c{}^t} + (1-\delta_c^t).{QD_c}^{-\rho_c{}^t}\right)^{\frac{1}{\rho_c^t}} \tag{A.22}$$

$$\frac{QE_c}{QD_c} = \left(\frac{PE_c}{PDS_c}.\frac{1-\delta_c^t}{\delta_c^t}\right)^{\frac{1}{\rho_c^t+1}} \tag{A.23}$$

$$QX_c = QD_c + QE_c \tag{A.24}$$

Also, the government's main source of revenue, as shown in equation A.25, are from taxes on goods *(Ti)*, households *(Td)*, firms *(Tde)*, imports duties *(Tim)*, export duties *(Tex)*, and other sources of transfers from enterprises *(Teg)* and the rest of the world *(trg)*.

$$Yg = \sum_{im} Tim_{im} + \sum_{ex} Tex_{ex} + Td + Tde + \sum_{m} Ti_m + Trg + Teg + Tgm \tag{A.25}$$

Government either uses part of the income *(Yg)* on public services or other expenditure *(G)* and saves *(S)* the rest.

$$Sg = Yg - G \tag{A.26}$$

Some of the main characteristics of the EXTER model are as follows:

- A small open economy with the rest world represented as a new agent
- There are two categories of household namely: Small-holder farm households and Others
- There are ten sectors and activities in the Economy. They include the agricultural sector which covers small and large farming sectors, and the livestock, forestry and fishing sectors. They also cover the non-farming sectors including the mining, industry, trade, the private and public services sectors
- The two production factor are internationally immobile, while labour is perfectly mobile work. There is a special capital for the first three sectors, but none in the non-marketed services

A.3.3 Exter Model Equations

The following are the main equations of our exter model:

Parameter definition

1- Production functions

v_j	Share of the value added in the production (Leontief) of sector j
io_j	Share of intermediary consumption in the production (Leontief) of sector j
aij_{ij}	Intermediary consumption of good i by unity of production of sector j
δ_j	Share of sector j value added of in GDP at factor cost
B	Equilibrium land price
p_alpha	Transaction cost
Y_f	Produced output by farm type
$\mu_{fb,f}$	CES-share parameter
ρ_f	CES-elasticitiy parameter
δ_f	CES-productivity constant

2- CES function between capital and labor

A_{LHF}	Scale parameter of the value added CES function of sector LHF
α_{LHF}	Share parameter of the value added CES function of sector LHF
ρ_{LHF}	Substitution elasticity between labor and capital
σ_{jj}	Substitution parameter (value added function)

3- Demand functions

ψ_h^{RK}	Household h propensity to save
λ_h^{RK}	Share of Household RK in the wages bill

4. Tax rate

tx_{tr}	Indirect taxes rate imposed on sector tr products
tm_{tr}	Import tariff rate imposed on sector tr products
te_{tr}	Export tariff rate imposed on sector tr products
$ttip_{tr}$	Production tax rate imposed on sector tr
ty_h	Direct tax rate imposed on household h income
tye	Direct tax rate imposed on firms income

5. CES function between imports and domestic production

B_i^S	Scale parameter of the Armington CES function
δ_i^S	Share parameter of the Armington CES function
ρ_i^S	Substitution parameter
τ_i^S	Substitution elasticity (Armington function)

6. CET function between exports and domestic production

B_i^T	Scale parameter of the CET production function
δ_i^T	Share parameter of the CET production function
τ_i^T	Transformation elasticity (CET production function)
ε_i^E	Price elasticity
ρ_i^T	Transformation parameter
EXD_i^0	Scale parameter

Variables definitions

1. Production

Va_{LHF}	Value added of sector LHF
$XS_{j,t}$	Production of sector j
XXS_j	Production of sector j at basic prices
CI_j	Total intermediary consumption of sector j
DI_j	Intermediate demand of product i by sector j

4- Prices

w_t	Average wage
r_t	Capital return in sector j
Pv_t	value added price of sector j
Pc_t	Market price of the composite good belonging to sector j
PL_t	Producer price of sector j product sold on the domestic market
Pm_{tr}	Domestic price of the imported good j
PE_{tr}	Producer price of the exported good j
PE^{tr}_{fob}	Fob price of the exported good j
P_i	Production price on the factor cost of sector j

5- Revenues and Savings

YM_h	Household h income
YDM_h	Disposable income of household h
YE_f	Firms savings
YG	Government Income
SE_f	Firms savings
SM_h	Household h savings

5- Tax revenues

TD_h	Receipts from direct taxes of household h
TDE_f	Receipts from direct tax of firms
TI_{tr}	Receipts from indirect tax of sector j
TIM_{tr}	Receipts from import tariffs of good j
TIE_{tr}	Receipts from export tariffs of good j
TIP_{tr}	Receipts from production taxes

6- External Trade

EX_i	Export supply of product i
EXD_i	Export demand of product i
M_i	Import demand of product i
Q_i	Supply of composite product belonging to sector i
D_i	Domestic production of sector j sold on the domestic market

$$XSS_j = min\left(\frac{CI_j}{io_j}, \frac{VA_j}{v_j}\right) \tag{A.27}$$

$$VA_{LHF} = A_{LHF}\left(\alpha_{LHF}.LD_{LHF}^{-\rho_{LHF}} + (1-\alpha_{LHF})KDC_{LHF}{}^{-\rho_{LHF}}\right)^{-\frac{1}{\rho_{LHF}}} \tag{A.28}$$

$$VA_{OTH} = A_{OTH}\left(\alpha_{OTH}.LD_{OTH}^{-\rho_{OTH}} + (1-\alpha_{OTH})KDC_{OTH}{}^{-\rho_{OTH}}\right)^{-\frac{1}{\rho_{OTH}}} \tag{A.29}$$

$$VA_{SHF} = min\left(\frac{LD_{SHF}}{io_{SHF}}, \frac{KDC_{SHF}}{v_{SHF}}\right) \tag{A.30}$$

$$CI_j = io_j XSS_j \tag{A.31}$$

$$DI_{tr,j} = aij_{tr,j} CI_j \tag{A.32}$$

$$LD_{jj} = \left[\frac{\alpha_{jj}}{1-\alpha_{jj}}, \frac{R_{jj}}{s_{jj}}\right]^{\sigma_{jj}} KD_{jj}; jj = LHF, OTH \tag{A.33}$$

$$KDC_{jjj} = A_{jjj}\left(\alpha_{jjj} Land_{jjj}^{-\rho_{jjj}} + (1-\alpha_{jjj}) {KD_{jjj}}^{-\rho_{jjj}}\right)^{-\frac{1}{\rho_{jjj}}} jjj = LHF, SHF \tag{A.34}$$

$$Land_{jjj} = \left[\frac{\alpha_{jj}}{(1-\alpha_{jj})}, \frac{R_{jj}}{pland_{jj}}\right]^{\sigma_{jj}} KD_{jj}; jj = LHF, SHF \tag{A.35}$$

Equations: Revenue and Savings

$$YM_h = YMW_h + YMK_h + TMTR_h \tag{A.36}$$

$$YMW_h = s_{SHF} LS_{SHF} + s_{jjjj} LS_{jjjj} jjjj; = LHF, OTH \tag{A.37}$$

$$LS_F = B^T\left(\delta_T LS_{SHF}^{\rho^T} + (1-\delta^T) {LS_{NSHF}}^{\rho^T}\right)^{\frac{1}{\rho^T}} \tag{A.38}$$

$$LS_{SHF} = \sum_{SHF} LD_{SHF} \tag{A.39}$$

$$LS_{SHF} = \left[\frac{(1-\sigma^T)}{\sigma^T}\left(\frac{S_{SHF}}{S_{NSHF}}\right)\right]^{\tau^E} LS_{NSHF} \tag{A.40}$$

$$LS = LS_{NF} + LS_F \tag{A.41}$$

$$YMK_h = \lambda_h^{RK} \sum_{tr} r_{tr} KD_{tr} + DIV + pland * land \tag{A.42}$$

$$TMTR_h = \sum_{ag} TR_{h,ag} \tag{A.43}$$

$$SM_h = \psi_h YDM_h \tag{A.44}$$

FIRMS

$$YE_f = (1 - \sum_{ag} \lambda_{ag}^{RK}) \sum_{tr} r_{tr} KD_{tr} + \sum_{ag} TR_{f,ag} \tag{A.45}$$

$$SE_f = YE_f - \sum_{h} DIV_{h,f} - \sum_{f} TDE_f - \sum_{ag} TR_{ag,f} \tag{A.46}$$

GOVERNMENT

$$\begin{aligned} YG = \sum_{tr} TIP_{tr} + \sum_{tr} TIM_{tr} + \sum_{tr} TIE_{tr} + \sum_{tr} TI_{tr} + \\ \sum_{h} TD_h + \sum_{f} TDE_f + \lambda_g^{RK} \sum_{tr} r_{tr} KD_{tr} + \sum_{ag} TR_{g,ag} \end{aligned} \tag{A.47}$$

$$TIP_{tr} = ttip_{tr} p_{tr} XS_{tr} \tag{A.48}$$

$$TIM_{tr} = tm_{tr} ePWM_{tr} M_{tr} \tag{A.49}$$

$$TIE_{tr} = te_{tr} Pe_{tr} EX_{tr} \tag{A.50}$$

$$TI_{tr} = tx_{tr}(P_{tr} XS_{tr} - PE_{tr} EX_{tr}) + tx_{tr}(1 + tm_{tr}) ePWM_{tr} M_{tr} \tag{A.51}$$

$$TD_h = ty_h YM_h \tag{A.52}$$

$$TDE = tye YE_f \tag{A.53}$$

$$SG = YG - G - \sum_{ag} TG_{g,ag} \tag{A.54}$$

<u>Final Demand Bloc</u>

$$C_{tr,h} = C_{tr,h}^{min} + Y_{tr,h} \left[\frac{CHT_h - \sum_{tr} PC_{tr} C_{tr,h}^{min}}{PC_{tr}} \right] \tag{A.55}$$

$$CHT_h = YDM_h - SM_h \tag{A.56}$$

$$INV_{tr} = \frac{\mu_{tr} IT}{PC_{tr}} \tag{A.57}$$

$$CG_i = \frac{\mu_i^G G}{PC_i} \tag{A.58}$$

$$DIT_{tr} = \sum_j aij_{tr,j} CI_j \tag{A.59}$$

Prices Bloc

$$PV_i = \frac{P_i XS_i - \sum_{tr} PC_{tr} CI_{tr,i}}{VA_i} \tag{A.60}$$

$$PL_i = \frac{PD_i}{(1 + tx_i)} \tag{A.61}$$

$$P_i = \frac{PT_i}{(1 + ttip_i)} \tag{A.62}$$

$$PM_{tr} = (1 + tx)(1 + tm) ePWM_{tr} \tag{A.63}$$

$$r_{tr} = \frac{PV_{tr} VA_{tr} - SC_{tr} LDC_{tr}}{KD_{tr}} \tag{A.64}$$

$$PE_{tr} = \frac{ePE_{tr}^{FOB}}{1 + te_{tr}} \tag{A.65}$$

$$PC_i = \frac{PD_i D_i + PM_i M_i}{Q_i} \tag{A.66}$$

$$P_i = \frac{PL_i D_i + PE_i EX_i}{XS_i} \tag{A.67}$$

$$PINDEX = \sum_i \zeta_i^v PV_i \tag{A.68}$$

$$XS_i = \sum_j \alpha_{i,j} XSS_j \tag{A.69}$$

International Trade Bloc

$$XS_i = B_i^T \left(\delta_i^T EX_i^{\rho_i^T} + (1 - \delta_i^T) D_i^{\rho_i^T} \right)^{\frac{1}{\rho_i^T}} \tag{A.70}$$

$$EX_i = \left(\frac{(1 - \delta_i^T)}{\delta_i^T} \left(\frac{PE_i}{PL_i} \right) \right)^{\tau_i^E} D_i \tag{A.71}$$

$$Q_i = B_i^s \left(\delta_i^s {M_i^{\rho_i}}^S + (1 - \delta_i^S) {D_i^{\rho_i}}^S \right)^{-\frac{1}{\rho_i^S}} \tag{A.72}$$

$$M_i = \left[\frac{{\delta_i}^S}{(1 - \delta_i^S)} . \left(\frac{PD_i}{PM_i} \right) \right]^{\tau_i^S} D_i \tag{A.73}$$

$$EXD_i = EXD_i^0 \left[\left(\frac{PWE_i}{PE_i^{FOB}} \right) \right]^{\varepsilon_i^E} \tag{A.74}$$

$$BAC = e \sum_{tr} PWM_{tr} M_{tr} + \sum_{ag} TR_{row,ag} - \sum_{ag} TR_{ag,row} - e \sum_{tr} PE_{tr}^{FOB} EX_{tr} \tag{A.75}$$

Equilibrium Equations Bloc

$$Q_i = + \sum_i C_{i,h} + INV_i + CG_i + DIT_i \tag{A.76}$$

$$IT = SG + \sum_f SE_f + BAC + \sum_h SM_h \tag{A.77}$$

$$EXD_i = \sum_j EX_{i,j} \tag{A.78}$$

$$Land = LANS \tag{A.79}$$

$$LS_{NSHF} = \sum_{OTH} LD_{OTH} - LS_{NF} \tag{A.80}$$

Where

DIV	Dividends paid to capitalist households
G	Public expenditure
KD_{tr}	Capital demand by branch tr(volume)
LS	Total labour supply (volume)
M_{ind}	Import of industrial products (volume)
PWE_{tr}	World export price of tr
PWM_{tr}	World import price of tr
tr	World import price of tr
SR	Current account deficit of the balance of payments
TEW	Firms transfers to the rest of the world
TG	Government transfers to salaried households

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A.4 Land Market Gams Codes

```
**=============LAND MARKET MODULE=============================**
*---------------Sets definition-----------------*
Sets

AC              Global set for model accounts
/SA             Small scale farmtype
LA              Large scale farmtype
LAN_C           Land commodity
LAB_C           Labor commodity
CAP_C           Capital commodity
LANN            Land
LABB            Labor
CAPP            Capital
U_HHD           urban household
R_HHD           rural household  /

F(AC)            Farmtypes
/SA, LA/

*C(AC)            commodities
*                 /LAN_C,LAB_C,CAP_C/

FB(AC)          Factors
/LANN,LABB,CAPP/
;

ALIAS (F,FJ);

*PARAMETERS

parameters
*================land demand ================*
farm_CES_delta(F)   CES-produktivity constant
farm_CES_mu(fb,f)   CES-share parameter
farm_ces_rho(f)     CES-elasticitiy parameter

*=========Objective Function=========*
dummy               dummy variable
sigma(f)            elasticity of subsition in CES-production
                    function

*TRANSACTION COSTS
p_alpha0(f)
p_alpha1(f)
u(f)
rho_inv(f)
esp(f)
;


*CES-Production functions for farm types
farm_CES_delta(F)       =1;
farm_CES_delta("LA")    =5;
farm_CES_mu("labb",f)   =0.5;
farm_CES_mu("lann",f)   =0.4;
farm_CES_mu("capp",f)   = 1- farm_CES_mu("labb",f)
                           -farm_CES_mu("lann",f);
```

```
farm_ces_rho(f)          =0.4;
sigma(f)                 =2;
farm_ces_rho(f)          =1/sigma(f)-1;

dummy                    =10;

p_alpha0(f)    = 1;
p_alpha1(f)    = 1;
*u(f)          = 1;
*rho_inv(f)    = 0.02;
*esp(f)        = 0.1;

*******************************************
*Land allocation model outside equilibrium run
*******************************************
*fixed variables
*output price

variables
TD_land(f)  traded land by farm type
omegga
;
positive Variables

v_XL(f)          total land supplied to farmtype f
V_Y(f)           produced output by farm type
V_QDF(f,fb)      Farmtype f demand for factors of production
v_PF(f,fb)       Price of type fb factors of production
                 by farmtype f
V_b1(f)          price of factor including transactions costs
V_B              equilibirum land price
V_P              equilibrium price of output
;

*----------Equations_definition----------*
EQUATIONS
*Market clearance
land_market(f)   Land market equation
land_market1     Land market equation
land_market2(f)  Land market equation
*inveq(f)

*factor demand
CES(F)           CES production function for factor fb
marg_CES(fb,f)   Marginal CES for activity C
defprice(f)
obj1             objective
;

*Production and commodity block
** Equilibrium :       supply=demand for each type of farmer
land_market(f)..       v_XL(f)+TD_land(f) =e= V_QDF(f,"LANN");

** market clearance condition
land_market1..            sum(f,TD_land(f))  =e= 0 ;

** land prices including transactions costs
```

```
land_market2(f)..          v_B1(f)-v_B - p_alpha0(f)-
                           2*p_alpha1(f)*TD_land(f)=e= 0;

** Production function
CES(F)..        V_Y(f) =e= farm_CES_delta(F)*
                SUM(fb,farm_CES_mu(fb,f)*
                V_QDF(F,FB)**(- farm_ces_rho(f)))
                **(-1/ farm_ces_rho(f));

defprice(f)..             V_b1(f) =e= v_pf(f,"LANN");

** factors demand , from profit maximization
marg_CES(fb,f)..     v_PF(f,fb) =E= v_p*farm_ces_delta(F)**
                     (-farm_ces_rho(F))
                     * farm_CES_mu(fb,f)* [V_Y(f)/V_QDF(F,FB)]
                     **((1 + farm_ces_rho(F)));

obj1..                     omegga =e= dummy;

*************************************************************
MODEL allocation_LAND

/
land_market ,
land_market1,
land_market2,
CES  ,
marg_CES  ,
defprice ,
obj1
*inveq
/;


parameter
v_XLo(f), V_Yo(f), V_QDFo(f,fb), v_PFo(f,fb),V_Po,V_b1o(f),V_Bo ;
** t is to make link between CGE and Land module
set t /1/

** zz to run simulation
zz /1*30/
;

Parameter
TD_land_res(f,zz),V_QDF_res(f,zz),PLND_SHF_res(SHFj,zz) ,
  PLND_LHF_res(LHFj,zz),LS_f_res(zz),LS_f_on_res(zz) ,
  LS_f_off_res(zz),dS_f_on_res(zz),bsf_res(zz),
LND_SHFj_res(SHFj,zz),LND_LHFj_res(LHFj,zz),S_f_on_res(zz),s_res(
  zz),ls_res(zz),ld_res(j,zz),va_res(j,zz),pva_res(j,zz),revLand1
  (zz),revLandv(zz),revLandvlhf(zz),revLandvshf(zz),revLandshf(zz
  ),revLandlhf(zz),gvsa,gvlaLS_f_off_lhf_res(zz),LS_f_off_nag_res
  (zz) , sf_off_res(zz) ,sf_lhf_res(zz),sf_nag_res(zz)

* Macro
dgdpva(zz), Evp(h,zz),er(zz), dct(zz),dmt(zz),dext(zz),ditt(zz)
*Price
dpq(i,zz), dpindex(zz)
```

```
*dcpi(zz),

** Revenu et Epargnes
dydm(h,zz), dye(zz),dyg(zz), dem(h,zz),deg(zz),dee(zz)

;
*loop (t,

v_XLo("SA")              =  sum(SHFj,LNS_SHFj.l(SHFj)) ;
v_XLo("LA")              =  sum(LHFj,LNS_LHFj.l(LHFj));
V_Yo("SA")               =  sum(SHFj,XSS.L(SHFj));
V_Yo("LA")               =  sum(LHFj,XSS.L(LHFj));
V_QDFo("SA","LANN")      =  sum(SHFj,LND_SHF.L(SHFj)) ;
V_QDFo("LA","LANN")      =  sum(LHFj,LND_LHF.L(LHFj));

V_QDFo("SA","LABB")      =  sum(SHFj,LD.L(SHFj));
V_QDFo("LA","LABB")      =  sum(LHFj,LD.L(LHFj));

V_QDFo("SA","CAPP")      =  sum(SHFj,KD.L(SHFj)) ;
V_QDFo("LA","CAPP")      =  sum(LHFj,KD.L(LHFj)) ;


v_PFo("SA","LANN")       = sum(SHFj, PLND_SHF.L(SHFj)*
                           LND_SHF.L(SHFj)/
                           sum(SHFjj,LND_SHF.L(SHFjj)));
v_PFo("LA","LANN")       = sum(LHFj, PLND_LHF.L(LHFj)*
                           LND_LHF.L(LHFj)/
                            sum(LHFjj,LND_LHF.L(LHFjj)));

v_PFo("SA","LABB")       =  bsf.L    ;

**~~~As in the initial model, we assume here that the price of
  labor is higher in LA than in SA

v_PFo("LA","LABB")       =  bsf.L*2;

v_PFo("SA","CAPP")       = sum(SHFj, R.L(SHFj)*
                            KD.L(SHFj)/sum(SHFjj,KD.L(SHFjj)))
  ;

v_PFo("LA","CAPP")       = sum(LHFj, R.L(LHFj)*
                           KD.L(LHFj)/sum(LHFjj,KD.L(LHFjj)))      ;

V_Po                     = [sum(SHFj,PP.L(SHFj)*
                           VA.L(SHFj)/sum(SHFjj,VA.L(SHFjj)))
                           + sum(LHFj,PP.L(LHFj)*VA.L(LHFj)
                           /sum(LHFjj,VA.L(LHFjj)))]/2;

V_Bo                     =    1;

V_b1o(f)                 = v_PFo(f,"LANN");

V_P.fx                   = V_Po;
V_y.l(f)                 = V_yo(f);
v_B.L                    = v_Bo;
V_QDF.l(f,fb)            = V_QDFo(f,fb);
v_XL.fx(f)               = v_XLo(f);
```

```
v_PF.fx("SA","CAPP")  =   v_PFo("SA","CAPP");
v_PF.fx("LA","CAPP")  =   v_PFo("LA","CAPP");
v_PF.fx("SA","LABB")  =   v_PFo("SA","LABB");
v_PF.fx("LA","LABB")  =   v_PFo("LA","LABB");
V_QDF.lo(f,fb)        =   0.01;
*v_B.Lo               =   0;
*invf.l(f)            =   1;
V_b1.l(f)             =   v_PFo(f,"LANN");


V_Y.l(f) =      farm_CES_delta(F)*
                SUM(fb, farm_CES_mu(fb,f)* V_QDF.l(F,FB)**
                (- farm_ces_rho(f)))**(-1/ farm_ces_rho(f));

v_PF.l(f,fb) =    v_p.l*farm_ces_delta(F)**
                 (-farm_ces_rho(F))*
                 farm_CES_mu(fb,f)*
                 [V_Y.l(f)/V_QDF.l(F,FB)]**((1 + farm_ces_rho(F)))
  ;


p_alpha0(f)        =0;
p_alpha1(f)        =0.00001;
*$ontext
*p_alpha0(f)       =p_alpha0(f)+0.0000000000000000000001;
loop (zz,
p_alpha1(f)        =p_alpha1(f)*1.25;
solve allocation_land using nlp maximizing omegga;
if(allocation_LAND.Modelstat lt 3 and allocation_LAND.solvestat
  =1,

TD_land_res(f,zz)    =TD_land.L(f);
V_QDF_res(f,zz)      =V_QDF.L(f,"LANN");
LNS_SHFj.FX(SHFj)    =V_QDF.L("SA","LANN");
LNS_LHFj.FX(LHFj)    =V_QDF.L("LA","LANN");

SOLVE CGE MAXIMIZING OMEGA USING NLP;
if(CGE.Modelstat lt 3 and CGE.solvestat =1,
*~~~~~~Saving results

PLND_SHF_res(SHFj,zz)     =(PLND_SHF.L(SHFj)/
                            PLND_SHFO(SHFj)-1)*100 ;
PLND_LHF_res(LHFj,zz)     =(PLND_LHF.L(LHFj)/
                            PLND_LHFO(LHFj)-1)*100 ;
LS_f_res(zz)              =(LS_f.L/LS_fo-1)*100 ;
LS_f_on_res(zz)           =(LS_f_on.L/LS_f_ono-1)*100 ;
LS_f_off_res(zz)          =(LS_f_off.L/LS_f_offo-1)*100 ;
S_f_on_res(zz)            =(S_f_on.L/S_f_ono-1)*100 ;
bsf_res(zz)               =(bsf.L/bsfo-1)*100 ;
LND_SHFj_res(SHFj,zz)     =(LND_SHF.L(SHFj)/LND_SHFO(SHFj)-1)*100
  ;
LND_LHFj_res(LHFj,zz)     =(LND_LHF.L(LHFj)/LND_LHFO(LHFj) -1)*100
   ;

revLand1(zz)              =SUM(SHFj,LND_SHF.L(SHFj)*
                            PLND_SHF.L(SHFj))+
                            SUM(LHFj,LND_LHF.L(LHFj)*
```

```
                                  PLND_LHF.L(LHFj));

revLandlhf(zz)                   =SUM(LHFj,LND_LHF.L(LHFj)*
                                  PLND_LHF.L(LHFj));

revLandshf(zz)                   =SUM(SHFj,LND_SHF.L(SHFj)*
                                  PLND_SHF.L(SHFj));

revLandvshf(zz)                  = (revLandshf(zz) /revLandshfo -1)*100;

revLandvlhf(zz)                  = (revLandlhf(zz) /revLandlhfo -1)*100;

revLandv(zz)                     = (revLand1(zz) /revLando -1)*100;

s_res(zz)                        = (s.L/so-1)*100 ;
ls_res(zz)                       = (ls.L/lso-1)*100 ;
ld_res(j,zz)                     = (ld.L(j)/ldo(j)-1)*100 ;
va_res(j,zz)                     = (va.L(j)/vao(j)-1)*100 ;
pva_res(j,zz)                    = (pva.L(j)/pvao(j)-1)*100;

dgdpva(zz)                       =[sum(j,va.l(j))/
                                   sum(j,vao(j))-1]*100;

Evp(h,zz)                        =PROD(mar,(pqo(mar)/
                                 pq.l(mar))**gamma_LES(mar,H))
                                 *(CB.l(H)-SUM(marJj,CMIN.l(marjj,H)
                                 *pq.l(marjj)))
                                 -(CBO(H)-SUM(marjj,CMINO(marjj,H)
                                 *pqo(marjj)));

evp(h,zz)                       =Evp(h,zz)*100/[CBO(H)-
                                  SUM(marjj,CMINO(marjj,H)*pqo(marjj))];

dct(zz)                         =[sum(i,c.l(i))/sum(i,co(i))-1]*100;
dmt(zz)                         =[sum(i,m.l(i))/sum(i,mo(i))-1]*100;
dext(zz)                        =[sum(i,ex.l(i))/sum(i,exo(i))-1]*100;
ditt(zz)                        =[it.l/ito-1]*100;

dpq(i,zz)                       =(pq.L(i)/pqo(i)-1)*100 ;
*dcpi(zz)                       =(cpi.L/cpio-1)*100 ;
dpindex(zz)                     =(pindex.L/pindexo-1)*100 ;

** Revenu et Epargnes
dydm(h,zz)                        =(ydm.L(h)/ydmo(h)-1)*100 ;
dye(zz)                           =(ye.L/yeo-1)*100 ;
dyg(zz)                           =(yg.L/ygo-1)*100 ;
dem(h,zz)                         =(em.L(h)/emo(h)-1)*100 ;
deg(zz)                           =(eg.L/ego-1)*100 ;
dee(zz)                           =(ee.L/eeo-1)*100 ;

*continue;
else
abort "Edmond says there is a CGE Problem ";
);
else
abort "Edmond says there is a Land module Problem";
);
```

```
331
332   );
333   *$offtext
334
335   display TD_land_res,V_QDF_res,  V_QDFo, RO, R.L;
336   display PLND_SHF_res, PLND_LHF_res;
337   display LND_SHFj_res,LND_LHFj_res;
338   display s_res,ls_res,ld_res,va_res,pva_res ;
339   display evp
340   display  LS_f_res,LS_f_on_res ,S_f_on_res , bsf_res ,s_res,
        LS_f_off_res,dydm
341
342   *$exit
343
344
```

Appendix B
Social Networks

B.1 Questionnaire

Christian-Albrechts-Universität zu Kiel

Evidence-Based Agricultural Policy Processes in Sierra Leone

A research study by the University of Kiel's Institute of Agricultural Policy, Kiel, Germany and the International Food Policy Research Institute, Washington DC, USA.

Prof. Dr. Dr. Christian Henning (Institute of Agricultural Policy, University of Kiel, Kiel, Germany)
Dr. Ousmane Badiane (International Food Policy Research Institute, Washington DC, USA.)
Mr. Edmond Augustine Kanu (Institute of Agricultural Policy, University of Kiel, Kiel, Germany)

Questionnaire: Sierra Leone's Agricultural Policy Network Survey

Organisation's Name: _____

Organisation's ID: _____

Organisation's Contact: _____

Interviewer: _____

Interviewer Number: _____

Date of Interview: _____

Country: _____

Introduction

The overall goal of the project is to conduct research on African policy processes in close collaboration with stakeholders and policy makers in Ghana, Malawi, Senegal, Uganda and Sierra Leone. The aim of the project is to help identify practical institutional strategies that will help policy-makers and administrative staff at the central and local levels as well as civil society to reduce what can be referred to as "political performance gaps" so as to effectively exploit existing policy options to reduce poverty and promote sustainable growth.

I would also like to mention that **you are the expert** and we would like **to learn** from you. That is, what **you know** is absolutely important and sufficient for us. That means, there are **no wrong answers**.

The interview will focus on the preferences of your organisation concerning growth in income, food security strategies, poverty reduction, agricultural infrastructural development and agricultural land markets. Furthermore, we would like to learn more about the relationship of your organization with other organizations and political institutions.

Finally, we want to reassure you that all information you provide will be treated confidentially, and no individual data will be published.

Thank you again for your support and for spending your valuable time with me to go through the questionnaire.

Part I. Policy Goals I

Question 1. Policy Goals: Relative importance

A selection of 4 different policy goals are presented below. We selected these goals by reading through policy documents related to general economic and agricultural policies in Sierra Leone. We think that you might have these goals in mind when talking about economic and agricultural policies in Sierra Leone.

What are the relative importance of these policy goals for your organization?

Please indicate the relative importance of these policy goals via distributing 100 points. The higher the points you distribute to a goal, the higher you think is your organisation's relative interest in it.

1.	Growth of the Gross Domestic Product (GDP)	____
2.	Poverty reduction	____
3.	Food Security	____
4.	Environmental sustainability	____
		100

Question 2. Policy Goals: Concrete positions

Now, we would like to ask you about the improvements you desire to achieve for each policy goal. We have therefore formulated two extreme positions for each policy goal on a 7-point scale. Please use the 7-point scale to locate your position. When you indicate your position, please consider the trade-offs between different policy goals. Please note that a policy can affect different goals simultaneously. Therefore, in general, it is not possible to simultaneously reach a maximal achievement for all policy goals, especially taking the restricted financial budget into account.

Please indicate, for each policy goal, the achievement you realistically desire in the medium term (say within the next 10 years) in Sierra Leone.

Question 2.01 Welfare of small holder farmers

The government, through the Small Holder Commercialization Program, sought to increase income of farming households by 10% and food security by 25% in 2015 (GoSL, 2009). Nonetheless, incidence of food insecurity (60%) and poverty (60.8%) still remain prevalent among small holder famers (World Bank, 2014, WFP, 2015).

What level of income do you desire in the medium term for small holder farmers?

Income of small holderfarmers is 25% lower	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Income of small holder farmers is 25% higher**

Question 2.02 Welfare of large scale farmers

Traditionally, there are very few large farms (10 ha or more) in Sierra Leone (Gomez, et al., 2012). However, since 2010, the country has recorded a sharp increase in the number of agribusiness investors in rice, sugar cane and oil palm. It is estimated that about a fifth of the country's agricultural land (1,154,777 hectares) has been leased out to various national and multinational corporations (Baxter, 2013: 25).

What level of income do you think is desirable in the medium term for large scale farmers?

Income of large scale farmers is 25% lower	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Income of large scale farmers is 25% higher**

Question 2.03 Welfare of the agro-business exporting sector

Agricultural export cash crops such as cocoa, coffee, and palm oil accounts for up to 16 % of Sierra Leone's GDP (Statistics Sierra Leone, 2014).While there is a custom duty exemption on agriculture inputs (fertilizers, seeds, pesticides, tractors/parts, machinery) into Sierra Leone, export of agricultural products (cocoa, coffee, piassava, kola nuts, ginger, and cashews) are subject to a levy currently set at 2.5% of the f.o.b. export value.

What agricultural export growth do you desire in the medium term?

GDP of agro-business exporter sector is 25% lower	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**GDP of agro-business exporter sector is 25% higher**

Question 2.04 Welfare of the non-agricultural sector

The services and industry sub-sectors accounts for 31.1%and 9.6 % of the nation's employment respectively (Statistics Sierra Leone, 2015).In the mining sector, in a bid to provide incentives to investors given the otherwise poor investment climate, corporate tax rate for mining companies was reduced from 37.5% to 30 % in 2011.

What GDP growth do you desire in the medium term for the non-agricultural sector?

GDP growth of the non-agricultural sector is 25% lower	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**GDP growth of the non-agricultural sector is 25% higher**

Question 2.05 Poverty reduction

Sierra Leone's poverty level reduced by an average of 1.1% per year between 2008 and 2015, reaching 50.9% in 2015 (HDR, 2016). Results of a Computable General Equilibrium modeling exercise carried out by the International Food Policy Research Institute(IFPRI) suggested that in order for Sierra Leone to have met her MDG targets in 2015, the Government should have targeted an annual agricultural growth rate of 7.1% (MAFFS, 2010).

What poverty level is realistic to achieve in the medium term?

50% of population living below the national poverty line	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**25% population living below the national poverty line**

Question 2.06 Food security

The results of Sierra Leone's2015 Comprehensive Food Security and Vulnerability Analysis indicatethat 41.2% of households in Sierra Leone are moderately food insecure, 8.6 % are severely food insecure, while the remaining 50.2 % were classified as food secure (WFP, 2015).

What percentage of (moderately) food insecure HH is realistic to achieve in the medium term?

40% of the households are (moderately) food insecure	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**All households are food secure**

Question 2.07 Provision of other public services

An important function of the State is to provide public good services, like education, social and health services. However, beyond these services the state has to finance agricultural policy programs like the Smallholder Commercialisation and Agribusiness Development Project.

How much of the national budget should be allocated to other public goods like electricity, security, water supply etc?

Reduce spending on other public goods by 25%	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Increase spending on other public goods by 25%**

Question 2.08 Human capital development

Developing Sierra Leone's human capital remains an important policy goal for successive governments. With increasing demographic pressure on existing educational infrastructure in the country, only about 3 percent of pupils were expected to complete secondary school with the pre-requisite qualifications to enter University (Montrose International, 2014). The government has declared a free education program and in its revised budget for FY 2018 allocated 21% to the educational sector (Budget Speech 13/08/2018).

What percentage of pupils should be expected to complete secondary school with the pre-requisite qualifications to enter University?

3% of pupils expected to complete secondary school with the pre-requisite qualifications to enter University	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**20% of pupils expected to complete secondary school with the pre-requisite qualifications to enter University**

Question 2.08 Provision of other public services

An important function of the State is to provide public good services, like education, social and health services. However, beyond these services the state has to finance agricultural policy programs like the Smallholder Commercialisation and Agribusiness Development Project.

How much of the national budget should be allocated to other public goods like electricity, security, water supply etc?

Reduce spending on other public goods by 25%	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Increase spending on other public goods by 25%**

Question 2.09 Gender equity

Research indicate that women farmers have a high potential to increase agricultural sector growth and food security (Mutangadura, 2004; Agarwal, 2003). However, in Sierra Leone, women farmers face many constraints that inhibit them from efficiently engaging in agricultural production. These include, discriminatory land laws, little access to extension services, and credit (ADB, 2007; NSADP, 2010). Carefully targeted investments might help to empower women and develop smallholder agriculture considerably.

To what extent should government formulate agricultural programmes in a gender sensitive sense?

No gender responsive agricultural investments	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Only gender responsive agricultural investments**

Question 2.10 Environmental sustainability

Agricultural related activities, particularly slash-and-burn agriculture and shifting cultivation practices, account for 75% for greenhouse gas emission in Sierra Leone (World Resources Institute, 2016; FAO, 2016). The resulting effects of these poor farming practices include land degradation and declining soil fertility and crop yields (GEF, 2014).

Which level of GDP loss due to poor environmental management is acceptable?

More than 15% of GDP is lost due to environmental degradation	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Less than 2% of GDP is lost due to environmental degradation**

Part II. Agricultural policies

Question 3. Distribution of budget among different policy options

Generally considering Sierra Leone's developmental priorities, we can broadly distinguish 3 different components of policy programmes as presented below.

Please indicate your preferred **budget shares** among these three components.

(1)	Provision of Public Goods	[70%]	____
(2)	Agricultural Policy	[5%]	____
(3)	Non-Agricultural Policy	[25%]	____
			100

Part III. Review of Laws, Regulations and Policies Pertaining to Land

Question 4. Policy positions: Concrete positions

We have identified two main thematic areas when reviewing laws, regulations and policies pertaining to land. **These two thematic areas are: issues related to land rights administration and issues related to acquisition and transfer of land property**. We want to discuss your policy position(s) on these issues using a 7-point scale. Please use the 7-point scale of the card to locate the position of your organization. Again, when giving us the position of your organization, please consider the trade-offs between different policy positions. So, it is generally not possible to reach simultaneously the maximal goals for all policy positions, as policies affect different policy positions simultaneously, especially taken the restricted financial budget into account.

1. Issues related to land rights administration

Question 4.01 Establishment of a new land administrative framework

Outside of the Western area, Paramount Chiefs are in charge of the overall management of community owned land in their respective chiefdoms, while the central government and local authorities are in charge of the overall management of land in the Western Area. Under the new land policy, a land commission and committee scheme will be introduced and it will be responsible for planning, managing and regulating all land related issues in Sierra Leone (MLCPE, 2015: 71-73).

What is your point of view on policy interventions that leads to the establishment of a centralised land management institution to manage and regulate land related issues in Sierra Leone?

Establishment of a centralised land management and administrative system	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Maintain decentralised land management and administrative system**

Question 4.02 Customary land governance reform

The unwritten nature of customary law and the divergent opinions about who has authority to allocate and lease land within land owning families give rise to legal uncertainties regarding property rights (Unruh and Turray, 2005).As a way of reforming the customary land tenure system, the National Land Policy sets out to "develop and mainstream customary land governance guidelines and administrative procedures to include transparency and access to information essential to the evolution of good governance in customary land delivery processes" (MLCPE, 2015: 56).

What is your point of view towards policy interventions that sets out to reform the governance structures under the customary land tenure system in Sierra Leone?

Support reform towards an effective and efficient land governance system	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Maintain existing governance structures under the customary tenure system**

Question 4.03 Establishment of a comprehensive land title registration system

Currently in Sierra Leone, there is no definitive statutory prescription for proof of land title. In areas where customary law obtains for instance, there is a complete absence of documentation of land rights. This fuels tenure insecurity and exacerbate the risk of costly land disputes. In Section 7.8 of the National Land Policy, governments intends to "ensure that as a matter of top priority a land title registration system is created for Sierra Leone." (MLCPE, 2015: 81-89). The current deed registration system, according to the policy, will be replaced by a title registration system – such that the compulsory registration of land will take place not only in the Western Area but now also in the Provinces.

What is your point of view towards policy interventions that results in the establishment of a comprehensive land title registration system in Sierra Leone?

Establish a comprehensive land title registration system	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Maintain the current deed registration system**

Question 4.04 Land rights demarcation, mapping and survey

Contested land boundaries is one of the most common causes of land conflicts and remains a major obstacle to the functioning of the land market in Sierra Leone. This is worsened by the unavailability of data about the actual demarcation of land available for different purpose including; investment, private use, farming or other uses (GOSL, 2013). The government intends to develop the capacity for land rights demarcation, survey, and mapping services by enhancing and technologically updating them to meet modern standards (MLCPE, 2015: 83).

What is your point of view towards policy interventions that sets out enhance and update land demarcation, survey and mapping services in Sierra Leone?

Enhance and technologically update land demarcation, survey and mapping services	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Maintain current land demarcation, survey and mapping services**

2. Issues related to acquisition and transfer of property rights

Question 4.05 Land property rights of women

While Section 27(1) of the constitution completely prohibits all forms of discrimination, section 27(4) waves this non-discrimination clause if it relates to, among others, the devolution of property under customary laws. This is particularly worrisome because under customary family law, women are not accorded equal access to land. Section 4.6 of the National Land Policy intends to invalidate and repeal all such discriminatory laws and practices and ensure that "women have the right to full and equal protection by the law and have the right not to be discriminated against on the basis of their gender or marital status". (MLCPE, 2015: 35)

What is your point of view towards policy interventions in the area of securing land rights of women?

Enact special laws and implement policies that leads to equal ownership of land by men and women	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Maintain existing laws and customary practices that restricts property right of women**

Question 4.06 Restrictions on transfer of property rights of foreigners and non-natives

There are a number of restrictions on land ownership in Sierra Leone. The Provinces Land Act, Cap 122of 1960limits the interest non-natives and foreigners can hold in provincial land to a leasehold of 50 years, while the Non-Citizens (interest in land) Act of 1966 imposes restrictions on foreigners who wish to acquire land rights in the western area of Sierra Leone. The processes involved in granting property rights to these category of persons are often cumbersome and tenuous and have been identified as a source of tenure insecurity, providing little incentives for investing in the agricultural sector. In order to change this status quo, section 4.1.8 of the National Land Policy sets out to review these laws, among others, and amend or repeal them as may be justified.(MLCPE, 2015: 40).

From your point of view, how much right should foreigners and non-natives have when it comes to the ownership of land?

Unrestricted land ownership by foreigners and non-natives throughout Sierra Leone	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**No land ownership by foreigners (throughout Sierra Leone) and non-natives (outside the Western Area)**

Question 4.07 Taxation of land leasehold fees

Under a previous arrangement recommended by the Ministry of Agriculture's investment guidelines, half of land leasehold fees goes to local (40%) and central government (10%), with actual land owners only receiving 50% of any amount paid. In Section 4.1.6 of the National Land Policy, government intends to continue with this implicit taxing arrangement by levying a progressive land tax on all lands allocated to commercial investments in rural and urban areas, beginning with landholdings above 2 hectares in rural areas. (MLCPE, 2015: 37)

What is your point of view towards policy interventions geared toward levying a progressive land tax on all lands allocated to commercial investments?

Actual land owners keep 100% of all future land leased fees	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Actual land owners receive 50% of all future land leasehold fees**

Question 4.08 Land property rights of large scale land investors

In addition to the fact that many large scale land investors compete with local farmers for the same areas of land, they are faced with a challenging and costly process to acquire or renewing leaseholds. In order to promote domestic and foreign investment in the agricultural sector, in the National Land Policy, it is recommended that non-citizens of Sierra Leone such as foreign enterprises be allowed access to land titles obtainable at the district level and land banks be established to pool land for these potential investors (MLCPE, 2015: 66).

What is your point of view towards policy interventions that promote domestic and foreign investment in agricultural land?

Adopt policies that make large scale land acquisition easier for investors	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Adopt policies that make large scale land acquisition difficult for investors**

Question 4.09 Land property rights of small holder farmers

As a result of large scale acquisition of agricultural land by large scale land investors, competition with local farmers for the same areas of land has resulted in widespread displacement of local farmers (Yengoh& Armah, 2014, Green Scenery, 2011). In section 6.4 of National Land Policy, government intends to protect the land rights of small holder farmers in the face of large-scale foreign investments by ensuring that investors act responsibly, respect human and land rights, and do no harm to food security, local livelihoods and the environment.

From your point of view, to what extent should government protects the land property rights of small holder farmers in the face of large-scale land investments?

Adopt specific policies that protect the property rights of small holder farmers in the face of large scale land acquisition	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Maintain the status quo which offers no specific protection of the land property rights of small holder farmers.**

Question 5. Policy positions: Relative importance

Now, we would like to know the relative interest of these different policy issues to your organizations. By relative interest we mean the compromises your organisationis willing to make in any political decision-making process. Generally,there are issues where your organization is interested in having your way compared to other issues where it is easier for your organisation to make a compromise.

Please indicate the relative importance of the policy goals below via distributing 100 points between them. The higher the points you distribute to a goal, the higher is your relative interest in it.

1. Land rights administration ____
2. Acquisition and transfer of land property rights ____

100

Question 5.01 Land rights administration

A selection of 5 different policy goals are presented below. We think that you might have these goals in mind when talking about land policy in Sierra Leone.

Please indicate the relative importance of the policy goals below via distributing 100 points between them. The higher the points you distribute to a goal, the higher is your relative interest in it.

1. Establishment of a new land administrative framework ____
2. Customary land governance reform ____
3. Establishment of a comprehensive land title registration system ____
4. Land rights demarcation, mapping and survey system ____

100

Question 5.02 Acquisition and transfer of land property rights

A selection of 4 different policy goals are presented below. We think that you might have these goals in mind when talking about land policy in Sierra Leone.

Please indicate the relative importance of the policy goals below via distributing 100 points between them. The higher the points you distribute to a goal, the higher is your organisation's relative interest in it.

1. Land property rights of women ____
2. Restrictions on transfer of property rights for foreigners and non-natives ____
3. Taxation of land leasehold fees ____
4. Land property rights of large scale land investors ____
5. Land property rights of small holder farmers ____

100

Part IV. Networks

Question 6. Reputation

While formulating agricultural policies, some actors involved in policy decision-making might be extremely influential. Here we have a list of organizations that influence the formulation of agricultural policy programmes.

Please check those organizations that stand out as especially influential and if you know other organizations which are not on the list, please use the free lines to specify them. (By filling in the list it is absolutely sufficient, if you only mark those organizations which you have in mind. It is not necessary to put great effort on a detailed investigation.)

Question 7. Expert information

Stakeholder organizations, research institutes or political actors can frequently provide expert information to other organizations, especially when consequences of complex policies have to be evaluated. Such kind of expert information comprises the knowledge of the effects of different policy instruments on the welfare of different social groups and the response of these specific social groups to these policies. Therefore, expert information is very important for political organizations as well as for other interest groups when designing and influencing agricultural policy programmes.

Expert information: Sender

Using the list of organizations again, please check all organizations to which your organization provides expert information on agricultural policies on a regular basis.

Expert information: Receiver

Using the list of organizations again, please check all organizations from which your organization receives expert information on agricultural policies on a regular basis.

Value of provided information

*Please check further those organizations from which your organization **receives extremely valuable** information.*

Question 8. Trust in external information

Obviously, interest groups provide a lot of different functions and services to their members. Taking your organization, what is the relative importance of (A) your own expertise in policy impact evaluation and (B) external information that you receive from other organizations?

Please distribute 100 points among the two sources of expert information according to their relative weight for your organization when forming the policy position.

a. own expertise	____
b. external information	____
Total	**100**

Question 9. Political support

In democracies, stakeholder organizations are representatives of their members and their interests. Therefore the policy position of such a group is highly connected with the resulting welfare for their members. Thus, a major role of stakeholder organizations in democracies is intermediating their clientele's interest to politicians, i.e. trying to influence policy or politicians to generate as much welfare as possible for their members.

Obviously, politicians won't support a stakeholder organization's position without any reward. On their part they expect in return the political support of members of the stakeholder organization. However, political agents also represent their electorate in parliament. Therefore, political agents are interested to find political solutions supported by a majority of their electorate.

Political support (Political actor)

Please check those organizations which are important for you regarding the intermediation of political positions supported by voters.

If you decide upon your political position regarding agricultural policy, to what extent is this position generally oriented towards the political support of stakeholder organizations, especially when your organization's position differs from the position supported by the majority of voter?

Please indicate the relative importance of your intrinsic position against the position supported by the majority of potential voters by distributing 100 points.

a. Intrinsic position _____

b. Position supported by voters _____

Total **100**

Political support (CSO)

Taking the above described kind of support relation between organizations and political agents into account, please check those political institutions on the listwith which your organization has such a relationship.

Question 10. Social relation

A lot of organizations which are nowadays active in the agricultural policy domain have already been active in the formulation process of previous agricultural programmes. Thus, it frequently occurs that the same people of different organizations have been communicating and working together for a very long time. Therefore, some organizations have established social relations which go beyond their pure professional contacts facilitating the cooperation among these organizations at the same time.

Please tell me with which organization does your organization have such a relationship?

B.2 List of Interviewed Organisations

Table B.1: Interviewed Organizations

Acronym	Orgname	Orgtype	IDC
OPRES	Office of the President	EXEC	0.87
MAF	Ministry of Agriculture and Forestry	EXEC	0.97
MOF	Ministry of Finance	EXEC	0.84
MLHE	Minister of Lands, Housing and Environment	EXEC	0.95
MLGRD	Minister of Local Government and Rural Development	EXEC	0.68
MOPED	Ministry of Planning and Economic Development	EXEC	0.66
MTI	Ministry of Trade and Industry	EXEC	0.71
BSL	Bank of Sierra Leone	PUBAG	0.66
EPA	Environmental Protection Agency of Sierra Leone	PUBAG	0.66
NRA	National Revenue Authority	PUBAG	0.66
SLIEPA	Sierra Leone Investment and Export Promotion Agency	PUBAG	0.79
Stats SL	Statistics Sierra Leone	PUBAG	0.68
APC	All Peoples Congress	LEG	0.39
SLPP	Sierra Leone Peoples Party	LEG	0.45
PCAF	Paliamentary Committee on Agriculture and Forestry	LEG	0.55
DC	District councils	LGVT	0.79
PC	Paramount Chiefs	LGVT	0.89
ALLAT	Action for Large-scale Land Acquisition Transparency	CSO	0.32
GS	Green Scenery	CSO	0.55
ADB	African Development Bank	DONOR	0.68
DFID	Department for International Development of the British Government	DONOR	0.55
EU	European Union	DONOR	0.84
FAO	Food and Agricultural Organisation of the United Nations	DONOR	0.79
IMF	International Monetary Fund	DONOR	0.76
UNDP	United Nations Development Programme	DONOR	0.89
WB	World Bank	DONOR	0.82
WFP	World Food Program	DONOR	0.68
Action Aid	Action Aid	iNGO	0.26
NAMATI	NAMATI	iNGO	0.37
WHH	Welt Hunger Hilfe	iNGO	0.68
SLARI	Sierra Leone Institute of Agricultural Research	RESEARCH	0.47
NU	Njala University	RESEARCH	0.42
DWFC	District Women's Farmers Cooperatives	IG:PROD	0.45
NFFSL	National Federation of Farmers of Sierra Leone	IG:PROD	0.82
SLPMC	Sierra Leone Produce Marketing Company	IG:AGIND	0.55
SLCAB	Sierra Leone Chamber of Agri-Business	IG:AGIND	0.42
SLCCIA	Sierra Leone Chamber of Commerce, Industry & Agriculture	IG:AGIND	0.53
AYV	African Young Voices Radio/Television	MEDIA	0.24
RADIO D	Society for Radio Democracy 98.1 FM	MEDIA	0.39

Source: Calculated by authors from own data.

Declaration of co-authorship

If a dissertation is based on already published or submitted co-authored articles, a declaration from each of the authors regarding the part of the work done by the doctoral candidate must be enclosed when submitting the dissertation.

1. Doctoral candidate
Name: Edmond Augustine Kanu

2. This co-author declaration applies to the following article:
An Assessment of Land Reform Policy Processes in Sierra Leone: A Network-Based Approach

The extent of the doctoral candidate's contribution to the article is assessed on the following scale:

A. Has contributed to the work (0-33%)
B. Has made a substantial contribution (34-66%)
C. Did the majority of the work independently (67-100%)

3. Declaration on the individual phases of the scientific work (A,B,C)	Extent
Concept: Formulation of the basic scientific problem based on theoretical questions which require clarification, including a summery of the general questions which, it is assumed, will be answerable via analyses or concrete experiments/investigations	C
Planning: Planning of experiments/analyses and formulation of investigative methodology, including choice of method and independent methodological development, in such a way that the scientific questions asked can be expected to be answered	C
Execution: Involvement in the analysis or the concrete experiments/investigation	C
Manuscript preparation: Presentation, interpretation and discussion of the results obtained in article form	

4. Signature of all co-authors		
Date	**Name**	**Signature**
20.04.2021	Prof. Dr. Dr. Christian H.C.A. Henning	

5. Signature of doctoral candidate		
Date	**Name**	**Signature**
20.04.2021	Edmond Augustine Kanu	

Declaration of co-authorship

If a dissertation is based on already published or submitted co-authored articles, a declaration from each of the authors regarding the part of the work done by the doctoral candidate must be enclosed when submitting the dissertation.

1. Doctoral candidate
Name: Edmond Augustine Kanu

2. This co-author declaration applies to the following article:
An Exponential Random Graph Models (ERGM) Approach to Assessing Lobbying and Political Power in Sierra Leone

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Concept: Formulation of the basic scientific problem based on theoretical questions which require clarification, including a summery of the general questions which, it is assumed, will be answerable via analyses or concrete experiments/investigations	C
Planning: Planning of experiments/analyses and formulation of investigative methodology, including choice of method and independent methodological development, in such a way that the scientific questions asked can be expected to be answered	C
Execution: Involvement in the analysis or the concrete experiments/investgation	C
Manuscript preparation: Presentation, interpretation and discussion of the results obtained in article form	C

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