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Formal Land Rights Security and Agricultural Productivity
Can Factor Endowments Explain the Divergent Findings?

by

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Abstract

Institutions are commonly thought of as crucial determinants for economic development. This argument is also prominent in the literature regarding property rights institutions as many studies stress their significance for economic performance. In light of these studies, many international organizations have argued strongly for land rights reforms in developing countries as means to reduce poverty, because more secure formal land rights could provide incentives for farmers to undertake productivity-enhancing investments. Nonetheless, while some studies have found that there is a positive relationship between formal land rights security and agricultural productivity, other studies have not. A possible explanation to these divergent findings involves factor endowments, more precisely the relative abundance or scarcity of land. Since earlier studies overlook that factor endowments may constitute an explanation and tend to not attempt to place the land rights debate into a broader context of institutional economics, this thesis aims to make a unique contribution to the research area by drawing on new institutional economics, by systematically and critically reviewing earlier studies, and by evaluating the factor endowments explanation. The thesis concludes that the drawbacks of earlier studies are too many to infer any useful conclusions regarding the explanatory power of factor endowments. The thesis does, however, argue that a potential explanation regarding factor endowments at least should consider the existence of credit and leasing markets, as well as take into account the adequacy of utilized agricultural technologies in particular contexts, because these three factors could potentially constitute important considerations for future land rights reforms.

Keywords: *formal land rights security, agricultural productivity, factor endowments, institutions, land rights debate, institutional environment, embeddedness.*

Table of Contents

- 1. Introduction.....5-6**
- 2. Theory: Land Rights and Factor Endowments.....7-12**
- 3. Empirical Analysis.....13-30**
- 4. Conclusion.....31-33**
- References.....34-38**

List of Charts, Tables and Figures

Figure 1. A Classification of Institutions.....	7
Table 1. Studies Linking Formal Land Rights to Agricultural Productivity.....	14

1. Introduction

Recent academic work has increasingly turned its attention towards the link between institutions and economic development, and as has been shown, institutions have an important role to play (Greif, 2006; North & Thomas, 1971; North & Thomas, 1973; North, 1981; North & Weingast, 1989; North, 1990; North, 1992). This argument is also prominent in the literature regarding property rights institutions as a high number of studies have argued that more secure property rights are conducive to improved economic performance (Coase, 1960; Alchian, 1965; Demsetz, 1967; Alchian & Demsetz, 1973; Barzel, 1989; Barzel, 2000; Libecap, 1989; Eggertson, 1990; Pejovich, 1972; Furubotn & Pejovich, 1972; Cheung, 1970; De Long & Shleifer, 1993; Anderson & Hill, 1975, Anderson & Hill, 1990; Barro, 1991, Acemoglu et al, 2001; Acemoglu & Johnson, 2005; Binswanger et al, 1995; de Soto, 2000; Knack & Keefer, 1995).

In light of the above-referred studies, the formalization of land rights in developing countries has become a central issue since more secure formal land rights may provide farmers the proper incentives to undertake productivity-enhancing investments (Swynnerton, 1954; Johnson, 1972; Firmin-Sellers, 1996; Feder & Noronha, 1987; Feder & Feeny, 1991; Feder & Nishio, 1998); a reason being that farmers would be “better assured of reaping future benefits of their present efforts” (Platteau, 1996: 36). Organizations – including the World Bank and organizations belonging to the United Nations – have strongly argued for the implementation of land rights reforms that could increase the agricultural productivity of farmers and ultimately reduce poverty in developing countries (World Bank, 1989; World Bank, 1993; Holden et al, 2009). As a result, a multitude of developing countries have – during the last thirty years – implemented land rights reforms; including Indonesia, Madagascar, Nicaragua, Honduras, Ghana, Burundi, and many other countries (SMERU, 2002; Bellemare, 2013; Bandiera, 2002; Atwood, 1990; Boucher et al, 2005; Boucher et al, 2006, Banerjee et al, 2002).

However, although the formalization of land rights appears to be well-grounded in the literature, studies have suggested that it should not be regarded as a magic bullet (Besley, 1995; Smith, 2004). Generally have land rights reforms at best shown mixed results on agricultural productivity (Place, 2009; Cotula et al, 2004; Besley & Burgess 2000), and studies that further have investigated the relationship between formal land rights security and

agricultural productivity have arrived at divergent findings. For instance, Feder et al (1988) concluded in the case of Thailand that more secure formal land rights affect agricultural productivity positively, whereas Migot-Adholla et al (1991) found that no such relationship exists in the case of three African countries. Nevertheless, one of the explanations that possibly could bridge the gap between the divergent findings involves factor endowments, more precisely the relative abundance or scarcity of land. Many studies that have analyzed formal land rights implicitly assume that land is a relatively scarce factor (Brück, 2003). This assumption does not always hold since there are contexts in which land is relatively abundant, and farmers' incentives to undertake productivity-enhancing, i.e. land-saving, investments are expected to be fewer under such circumstances since land can be used extensively (Boserup, 1965: 46, 65). Thus, for land rights reforms to have a positive effect on agricultural productivity, the population pressure first needs to become sufficiently large in order for land to become a relatively scarce resource.

Yet, despite Boserup's (1965) very early hypothesis regarding the importance of factor endowments, studies have predominantly focused on merely testing whether more secure formal land rights lead to increases in agricultural productivity, thereby overlooking that factor endowments may constitute a crucial determinant of the relationship between the two factors. Moreover have studies not attempted to place the land rights debate into a broader context of institutional economics, partial exceptions being studies by Platteau (1996) and Dercon & Krishnan (2010). Due to these drawbacks of earlier studies, this thesis aims to make a unique contribution to the research area by drawing on new institutional economics, by reviewing earlier studies, as well as by putting the explanation concerning factor endowments to the test. The thesis, hence, attempts to answer the following research question: Can factor endowments explain the divergent findings concerning the relationship between formal land rights security and agricultural productivity?

The thesis is structured as follows. Section 2 presents a theoretical background of land rights and factor endowments by placing these concepts into the framework of new institutional economics. Section 3 thereafter makes use of the theoretical framework so as to critically review and analyze the earlier studies that have been conducted with regards to formal land rights security and agricultural productivity. Section 4 then concludes the thesis with a summary of the thesis findings, along with recommendations for future studies and policy implications. Following is a list of references.

2. Theory: Land Rights and Factor Endowments

In order to gain a deeper understanding of land rights institutions and factor endowments, it is useful to place these concepts into the general framework of institutions, more commonly referred to as the new institutional economics. Institutions can in general be regarded as “the rules of the game in a society; more formally they are the humanly devised constraints” that “structure incentives in exchange, whether political, social, or economic” (North, 1992: 477). Subsequently, “[i]nstitutions provide the framework within which human beings interact”, constraining “people’s choice sets” (North, 1981: 201). Furthermore can institutions take many forms; they can for instance be divided into formal and informal institutions (North, 1990: 4). For this reason, it is helpful to classify institutions into broader categories. Such a classification is provided by Williamson (1994, 2000) who developed a multi-level model of economic systems. This model is presented in Figure 1, and as shown, institutions are

Figure 1. A Classification of Institutions

Level	Frequency (Years)	Purpose	Theory
<i>Level 1: Embeddedness</i> Informal institutions, customs, traditions, norms, religion	10^2 to 10^3	Often noncalculative; spontaneous	Social theory
<i>Level 2: Institutional Environment</i> Formal rules of the game - especially property (polity, judiciary, bureaucracy)	10 to 10^2	Get the institutional environment right	Economics of property rights, positive political theory
<i>Level 3: Governance</i> Play of the game - especially contract (aligning governance structures with transactions)	1 to 10	Get the governance structures right	Transaction cost economics
<i>Level 4: Resource Allocation and Employment</i> Prices and quantities, incentive alignment	continuous	Get the marginal conditions right	Neoclassical economics, agency theory

Sources: Williamson (1994, 2000).
Notes: Adapted from Oppor (2008).

arranged in accordance to their respective frequencies, i.e. how much time they require to change. The first level involves institutions that are embedded in a society, also being the institutions that take the longest time to change. These institutions include informal institutions such as norms, customs, traditions and religion. The second and third levels entail the institutional environment and governance respectively, where the former comprise formal institutions governing property rights, while the latter mainly concerns contracts. The fourth level of institutions is constituted by resource allocation and employment, where the main factors involved can be regarded as neo-classical since prices and quantities are of essence. The institutions on this level are also the ones that require the shortest amount of time to change.

At first glance, it may appear as if an analysis of land rights solely would involve the institutional environment as it is this level of an economic system that concerns property rights. Still, when also taking factor endowments into account, the embeddedness of institutions also becomes an important level to consider since informal institutions tend to govern property rights when land is a relatively abundant resource (Boserup, 1965: 63). Consequently should an analysis concerning land rights and factor endowments involve both the institutional environment and the embeddedness of institutions. With regards to the institutional environment, one type of theory is of main importance, namely property rights theory. As Demsetz (1967: 347) has highlighted, “[p]roperty rights are an instrument of society and derive their significance from the fact that they help a man form those expectations which he can reasonably hold in his dealing with others.” According to this view, the main goal of property rights is to internalize externalities, i.e. to lower potential transaction costs arising from social interdependencies. By these means, property rights fill an important function since they affect “the allocation and use of resources in specific and predictable ways” (Furubotn & Pejovich, 1972: 1139). Furthermore, “[p]roperty rights consist of a bundle of rights” (North, 1992: 478), and this bundle can be decomposed into at least five types of rights, namely (Barzel, 1989; Libecap, 1989; Eggertson, 1990):

- Using rights (usus)
- Alteration rights (abusus)
- Profit rights (usufructus)
- Selling rights
- Exclusion rights

As to the security of land rights – where security here is defined as when rights provide a high autonomy for farmers and are properly enforced – productivity-enhancing investments, and hence agricultural productivity, are expected to increase when land rights become more secure along the five above-mentioned dimensions. The rights to use and to physically transform land can be considered as necessary in order for a farmer to undertake productivity-enhancing investments since a farmer otherwise would not have the right, nor the incentive, to cultivate the land. Additionally, the right to earn an income from the land without interference from other parties – *inter alia* expropriation by the government – spurs farmers’ incentives since farmers thereby are more able to reap the fruit of their efforts. Along these incentive increasing effects – or the so-called investment-demand effects – selling rights further tend to widen the scope for productivity-enhancing investments because more secure selling rights tend to enable land transfers and/or leasing from less to more productive farmers, i.e. there is a transactions effect (Platteau, 1996). Moreover, as the security of land rights increases, another effect comes into play, namely the credit-supply effect (Binswanger & Deininger, 1999). When land rights are more secure – especially selling rights – land can to a greater extent be used as collateral when applying for credit (Hicks, 1969). One reason is that land, in comparison to other resources, can be regarded as an immobile resource that to a considerable degree is immune to damage, making land a desirable type of collateral (Binswanger & Rosenzweig, 1986). Another reason is that as more secure land rights reduce the uncertainty associated with the ownership of land and accordingly ascertain that land is a legitimate collateral (Feder & Feeny, 1991; Feder & Nishio, 1998), “lenders will ... be induced to extend more credit to agriculture” (Platteau, 1996: 37).

Nevertheless, for the three above-mentioned effects to be realized, the five dimensions of land rights need to be properly enforced. In the matter of enforcement, it is convenient to distinguish between private and communal forms of property rights to land. Making this distinction, it could be argued that private rights to land are more likely to be efficient than communal rights because the latter do not include the right to exclude others from using the land (Alchian & Demsetz, 1973; Cheung, 1970). Non-exclusivity in the rights to a resource implies that there is no way of excluding others from using it, except “by prior and continuing use of the resource” (Alchian & Demsetz, 1973: 19). Thus, as “negotiation costs are too high for all [farmers] to agree jointly on optimal behavior” (Demsetz, 1967: 356), and since the incentive of each farmer thereby will be to overcrop in order to maximize the income generated from the land, the tragedy of the commons will ensue (Hardin, 1968), i.e. the land

will become overexploited. Transaction costs can thereby be regarded as very high in the case of communal rights to land because such rights do not sufficiently enforce the income rights pertaining to a certain farmer, hence inducing farmers to not conserve their land. In other words, communal land rights cannot sufficiently internalize externalities. For this reason, private rights to land may be a better option. Private rights recognize farmers' rights to exclude others from using their land (Demsetz, 1967). As farmers thereby can expect that the incomes generated by their land, as well as the costs, will accrue to them and not to outsiders, each farmer will have an incentive to use his or her land efficiently. Private rights to land are thereby better at internalizing externalities than communal rights, implying that the agricultural productivity also would be higher for farmers with private rather than communal rights.

Still, the theoretical arguments highlighted above make two critical assumptions. One of these assumptions is that land is a relatively scarce resource. This assumption can be criticized on the ground that “[f]actor endowments may influence the directions in which institutions evolve” (Engerman & Sokoloff, 1994: 18). Institutions often evolve in order to capitalize on relatively scarce resources, because such resources tend to be characterized by a high marginal productivity, i.e. an augmentation of the input of such a resource is likely to significantly increase the output. As has been the case historically, labor rather than land has been the relatively scarce resource; something which in certain contexts has been denoted as Nieboer conditions (Austin, 2005: 155; Austin, 2009). Property rights in people, more commonly referred to as slavery, therefore developed so as to reap the benefits of the high marginal productivity of labor (Engerman & Sokoloff, 1994; Engerman & Sokoloff, 2002). Although these arguments pertain to relative labor scarcity, resembling arguments could be made when theorizing about factor endowments in terms of relative scarcity or abundance of land, as has been done by for instance Boserup (1965) and Binswanger & McIntire (1987). When land is relatively abundant, few incentives for productivity-enhancing, i.e. land-saving, investments could be expected since land can be used extensively (Boserup, 1965: 46, 65). There is thereby no competition for the land, and relying on fallow systems under communal rights to land may hence be regarded as efficient since land is sufficiently abundant to avoid overcropping (*ibid*: 70). However, as land becomes more relatively scarce due to population pressure, the competition for land is hypothesized to increase since the marginal productivity of land has increased. Consequently does the pressure for intensifying agriculture become larger, and the demand for land-saving technologies does in tandem increase (Boserup, 1965:

6, 46; Hayami & Ruttan, 1971; Binswanger & Ruttan, 1978). Still, for farmers to have incentives to undertake productivity-enhancing investments, the five types rights referred to above, as well as their enforcement, need to be granted to a farmer, whereby it is likely that farmers in conjunction with population pressure will demand a formalization of land rights (Boserup, 1965: 76). As factor endowments thereby can help to explain the evolution of institutions, it could be argued that private rights to land are unlikely to be efficient under land abundance; the reason being that farmers' incentives to undertake productivity-enhancing investments are few because land can be used extensively. Agricultural productivity is hence unlikely to alter when private rights to land are introduced to or strengthened in contexts where land is relatively abundant.

The other critical assumption is that farmers' preferences concerning private rights to property, or in this case land, are assumed to be in favor of private ownership. This assumption does not necessarily need to hold, in turn calling for that also the embeddedness of institutions need to be taken into consideration. According to Granovetter (1985), individuals in a society do not act in isolation from the informal institutions – i.e. the norms, customs, and traditions – characterizing that society. This argument becomes especially important for societies where land is relatively abundant since communal rights tend to govern land use, wherein these rights are determined by informal institutions (Boserup, 1965: 63). Moreover, Boserup (1965: 57) states that in relatively land abundant contexts, “[i]t is undeniable that many people hesitate to change accustomed [cultivation] methods ... and [that] it is possible that this attitude is more widespread in primitive communities than in more advanced.” The implication of this statement is that there would be a mismatch between informal and formal institutions if private rights to land were to be introduced to or strengthened in contexts where land is relatively abundant. Hence, as institutions require a goodness of fit to produce efficient outcomes, private rights to land are not expected to perform better than communal rights since the latter rights are more consistent with the customs – and thereby preferences – in land abundant communities. There are several additional reasons to why this assertion may hold true. Land provides a social safety net to farmers when rights to land are communal. Privatizing – i.e. formalizing – land rights under such circumstances might be detrimental to a community since the newly formalized rights may not adequately reflect the patterns of ownership that existed within that community prior to the formalization. Additionally, Platteau (1996) has highlighted that elites – typically being less productive than the farmers since elites tend to accumulate land solely for speculative

purposes – may try to manipulate the formalization process to their advantage. Land disputes and social unrest are therefore likely to emerge owing to the information asymmetries created by the formalization (Atwood, 1990; Deininger & Feder, 1998), implying that a formalization of land rights might lead to an externalization rather than an internalization of externalities. Furthermore, the enforcement of communal land rights in a land abundant context can be regarded as an uncomplicated issue. As transactions tend to be performed within the community, outsiders are easily detected (Feder & Feeny, 1991). There is thus no problem of excluding outsiders from using the community's plot of land since it lies in the interest of the whole community to jointly exclude outsiders from using it. Due to these reasons, private rights to land are not only unlikely to be as efficient as communal rights to land when land is relatively abundant, but private rights may also lead to problems that cause more inefficiency, whereby agricultural productivity not is expected to increase due to more secure formal land rights.

Summarizing the arguments above, it should be clear for the reader that both the embeddedness of institutions and the institutional environment should be taken into consideration when theorizing about land rights and factor endowments. When land is a relatively scarce resource, private rights to land are more likely to be efficient. Due to farmers' incentives to conserve their land, and owing to the reasonable expectations that farmers can form about the incomes that will be generated by the land, farmers will be more prone to undertake productivity-enhancing investments, in turn increasing the agricultural productivity. However, when land is relatively abundant, communal land rights are expected to perform as well as private rights, or even better. Since the population pressure is low in contexts where land is relatively abundant, there are fewer incentives to use land intensively because agricultural output can instead be increased by dint of extensification. Additionally, as informal institutions tend to govern land rights in contexts where land is relatively abundant, there would not be a goodness of fit between the informal and the formal institutions if land were to be privatized as the custom stipulates communal ownership. Productivity-enhancing investments, and thereby also agricultural productivity, are by these means not expected to increase when private rights to land are introduced to or strengthened in a context where land is relatively abundant. In sum, the hypothesis to be empirically evaluated is thus that more secure formal land rights are conducive to increased agricultural productivity when land is relatively scarce, whereas this positive relationship cannot be said to hold in a context where land is relatively abundant.

3. Empirical Analysis

Empirically evaluating the hypothesis stated in the preceding section requires a review of quantitative studies that have investigated the relationship between formal land rights security and agricultural productivity, as well as a measure accounting for factor endowments. Concerning the review of quantitative studies, Table 1 presents 24 studies that have analyzed the above-stated relationship in 26 cases; more specifically in 20 countries since some countries appear in more than one study, albeit in different time periods. What needs to be stressed, however, is that these studies have chosen to address the relationship in different ways, whereby the studies can be divided into three groups. The first group of studies solely focuses on the effects of more secure formal land rights on productivity-enhancing investments, including a high number of investment types, inter alia in fertilizer, irrigation, soil and water conservation, and draft animal services. The second group skips the investments and jumps right away to assess the effect on agricultural productivity. The third group includes both the effect on productivity-enhancing investments as well as the effect on agricultural productivity. Since all studies thereby directly or indirectly assess the effect of formal land rights security on agricultural productivity, Table 1 makes no difference between these types of studies.

With regards to factor endowments, a measure needs to be designed so as to consider situations in which land is relatively abundant or scarce. A solution to such a measurement is to use the population density as a measure since it captures the relative abundance or scarcity of land in relation to the population. Using this measure, a country is relatively land abundant when the population density is low, whereas a country can be regarded as relatively land scarce when the population density is high. Yet, a proper measure of population density in this case needs not to take an entire country into consideration due to two reasons. Firstly, it cannot be assumed that the whole land area in a country is relevant to agriculture since at least some land is devoted to other income-generating activities. A second issue, which is related to the first, is that the population also may be involved in other activities than agriculture. For these two reasons, a measure of population density should pertain to agriculture, i.e. a measure of the so-called agricultural population density is needed. As a measure of the population density typically divides the population by land, and since a measure of the agricultural population density is not readily available, a measure has to be constructed using data on the two individual components of the measure. Such data can be found at

Table 1. Studies Linking Formal Land Rights to Agricultural Productivity

<i>Author(s)</i>	<i>Country</i>	<i>Sample Year(s)</i>	<i>Positive Relationship?</i>	<i>Agricultural Population Density</i>
Foltz (2004)	Tunisia	1995	No	0.47
Deininger & Chamorro (2004)	Nicaragua	1990-1999	Yes	0.69
Carter & Olinto (2003)	Paraguay	1991-1994	Yes	0.75
Alston et al (1996)	Brazil	1980-1985	Yes	0.79
Johnson (1998)	Mexico	1995	No	0.90
Feder et al (1988)	Thailand	1984-1985	Yes	1.61
Twerefou et al (2011)	Ghana	2005	No	1.75
Zikhali (2008)	Zimbabwe	2007	Yes	1.75
Dlamini & Masuku (2011)	Swaziland	2008	Yes	1.80
Migot-Adholla et al (1991)	Ghana	1987-1988	No	2.03
Moor & Nieuwoudt (1998)	Zimbabwe	1995	Yes	2.40
Smith (2004)	Zambia	2001	Yes	2.60
Pender et al (2006)	Uganda	1999-2001	No	3.00
Pender & Kerr (1999)	India	1993	No	3.08
Carter et al (1989)	Kenya	1985-1986	No	3.19
Migot-Adholla et al (1991)	Kenya	1987-1988	No	3.29
Bellemare (2013)	Madagascar	2002	No	3.40
Hagos (2012)	Mozambique	2008	Yes	3.42
Jacoby & Minten (2005)	Madagascar	2005	No	3.61
Roth et al (1994)	Somalia	1987-1989	No	4.67
Holden et al (2009)	Ethiopia	1998-2006	Yes	4.88
Deininger & Jin (2006)	Ethiopia	1999-2001	Yes	4.94
Migot-Adholla et al (1991)	Rwanda	1987-1988	No	5.48
van den Broeck et al (2007)	Vietnam	2006	Yes	5.78
Li et al (2000)	China	1995	Yes	6.48
Do & Iyer (2008)	Vietnam	1992-1998	No	7.36

Sources: The above-referred studies, and FAO (2013).

Notes: The unit of measurement in the agricultural population density measure is the population per hectare.

the homepage of FAO (2013). With regards to the population, two measures can be regarded as main candidates, namely the rural population and the agricultural population. The first of these measures includes the whole population in rural areas, encompassing people involved in all income-generating activities in such areas, including agriculture, small businesses and rural industries. The second measure refers to people involved in agriculture, hunting, fishing and forestry. Although that the second measure also comprises people being involved in hunting, fishing, and forestry, the second measure can be regarded as superior as it to a greater extent refer to the population that potentially could be involved in agriculture. The thesis therefore chooses the agricultural population as the population measure when calculating the agricultural population density. Concerning land, the best measure would be to use the amount of cultivable land. Such data is, however, not available. The thesis does, nonetheless, arrive at two candidates for measuring cultivable land, namely the amount of land devoted to permanent and temporary crops, as well as the arable land plus permanent crops. While the first of these measures captures only the amount of land that is cultivated, the second measure also includes temporary meadows for mowing and pastures, and land temporarily in fallow. However, although that the first measure thus may be regarded as more appropriate than the second measure, a drawback is that data for the first measure only is available from the year 2001 and onwards, whereas data for the second measure is available from the year 1981 and onwards. Using the first measure for the amount of cultivable land would thereby result in that only eight out of 26 cases could be included in the analysis, rendering the analysis difficult to perform as there are very few cases available for arriving at useful conclusions. The thesis therefore chooses the second measure, in turn buying more cases at the expense of using a less accurate measure for the amount of cultivable land. In short, the thesis calculates the agricultural population density as the agricultural population, divided by the arable land plus the land devoted to permanent crops, where the findings from studies using data from 1981 and onwards are included.

Table 1 presents the figures from the agricultural population density calculations in each of the cases, and as shown, the expectation regarding factor endowments as an explanation does not seem to hold. The thesis earlier hypothesized that factor endowments would be able to explain why studies have arrived at divergent findings. It was expected that relatively land abundant communities would exhibit no positive relationship between the security of formal land rights and agricultural productivity, while relatively land scarce communities would exhibit such a relationship. Thus, using the agricultural population density as a proxy for

factor endowments, the relationship was expected to be positive at high densities and to not be positive at low densities. Contrary to expectations, nonetheless, Table 1 disconfirms factor endowments as an explanation.

However, it must be noted that the brief analysis conducted above can be considered as naïve since it masks a vast array of important issues that severely distort the analysis. The first of these issues entails the representativeness of the samples used in each study. Some of the studies in Table 1 have used nationally representative samples (Deininger & Chamorro, 2004; Hagos, 2012; Twerefou et al, 2011), whereas the other studies have not. So as to clarify this issue by utilizing examples, the lack of representativeness in the latter group of studies can be argued to exist in three dimensions, namely in terms of geography, in terms of the number of households included in the sample, as well as in terms of crops. Concerning geography, several studies have, as Deininger & Jin (2006: 1250) point out, analyzed “limited geographical domains.” Carter et al (1989: 1) use a “dataset from Kenya's highly commercialized Njoro area.” Foltz (2004) analyzes only the Cap Bon region of Tunisia. Johnson (1998) uses data collected from the states of Chiapas and Sonora in Mexico. Moor & Nieuwoudt (1998) evaluate land rights in the Manicaland Province of Zimbabwe. With regards to the number of households included in studies' samples, the most eye-catching example is the study undertaken by Dlamini & Masuku (2011) in the case of Swaziland that utilizes a survey of 63 households, which can be regarded as a relatively small number as Twerefou et al (2011) in the case of Ghana use data generated from 2690 households. Lastly, studies have tended to focus on a limited range of crops. Dlamini & Masuku (2011) focus solely on maize production. The study by van den Broeck et al (2007) merely considers rice production in Vietnam. Likewise is the case in Bellemare's (2013) study of Madagascar, but this study clearly highlights the importance of rice by arguing that it is a staple crop. In short have studies had a limited national representativeness of their samples, in turn complicating the analysis conducted above.

Yet, the approach to not consider a whole country when analyzing land rights is very likely to be more adequate. Recent studies have emphasized the existence of within-country variation concerning the effects of more secure formal land rights (Dercon & Ayalew, 2007; Dercon & Krishnan, 2010; Pande & Udry, 2006; Goldstein & Udry, 2008). A notable study by Besley (1995) that analyzes data from Ghana can be used to support this argument. Besley (1995) analyzes data from two Ghanaian regions, namely Wassa and Anloga, and reached the

conclusion that more secure formal land rights in Wassa were conducive to productivity-enhancing investments, while this relationship did not hold in Anloga. This finding clearly demonstrates that the effect of more secure formal land rights cannot be expected to be uniform within a country. Instead, a change in the security of formal land rights is expected to display heterogeneous effects in terms of productivity-enhancing investments, and thereby agricultural productivity. Hence, on the basis of these arguments, the naïve analysis that was conducted above can be rejected altogether since analyzing land rights on a country-level fails to capture the within-country variation with regards to the effects of more secure formal land rights. Put differently, micro approaches should be strictly preferred to macro approaches. Nevertheless, micro approaches must choose samples that include sufficient variation in the security of formal land rights between households, or else the parameter estimates would be downward biased (Deaton, 1997).

In addition to the above-mentioned issue regarding samples, there are still a high number of other important issues that further obstruct the comparability of the studies in Table 1. A second issue pertains to a methodological problem that can be considered as rather technical, so-called endogeneity. In technical terms, endogeneity implies that the correlation between the error term and an independent – i.e. an explanatory – variable is different from zero. There are various sources of endogeneity; it may for instance occur because influential variables have been omitted from the estimation procedure, and/or due to measurement errors, e.g. because of misreported data. In case of the former, parameter estimates are biased upwards, whereas parameter estimates are biased downwards in case of the latter. An additional source of endogeneity concerns another technical term, so-called simultaneity. Simultaneity means that the causality between the independent and the dependent variable runs in both directions. In this case, it implies that the security of formal land rights may not only have an effect on productivity-enhancing investments, but at the same time, productivity-enhancing investments might have an effect on the security of formal land rights. As noted in several studies, farmers may undertake productivity-enhancing investments so as to improve the security of land rights (Baland et al, 1999; Brasselle et al, 2002; Besley, 1995; Sjaastad & Bromley, 1997; Platteau, 1996; Gray & Kevane, 2001; Place & Otsuka, 2001; Bruce, 1988; Holden & Yohannes, 2002). Thus, since both of the causal relationships in this context can be hypothesized to be positive, it is likely that simultaneity would lead to upward biased parameter estimates. Furthermore, a last source of endogeneity concerns that there may be a positive correlation between the security of formal land rights and agricultural productivity,

but not a relationship between them. Often, a proof of land ownership involves that a farmer possesses a title, i.e. a certificate to land, which in turn should grant a farmer his or her formal rights to a plot of land (Feder & Noronha, 1987; Brasselle et al, 2002; de Laiglesia, 2004). In reference to titles, Brasselle et al (2002: 374) highlight that when “title acquisition and title maintenance involve real expenditures, it is a priori possible that farmers tend to register land parcels that benefit from comparatively high levels of investment, or that registered farms are those which have better profitability conditions justifying such expenditures.” This argument gains further support by Moor & Nieuwoudt (1998: 611) who argue that “[t]he decision to register land title ... or to update existing titles, requires purposeful choices by the farmers themselves.” In light of the arguments in these two studies, it is probable that parameter estimates will be upward biased when using whether a farmer has a title as a proxy for formal land rights security since the estimates only will reflect a positive correlation and not a positive relationship. Thus, summarizing all the arguments above concerning the sources of endogeneity, endogeneity is likely to lead to biased parameter estimates, whereby studies could be led to draw the conclusion that more secure formal land rights have a positive effect on agricultural productivity despite that the relationship in fact does not hold, and vice versa.

There are mainly three ways in which endogeneity can be addressed, namely by using instrumental variables regressions, by carefully choosing an appropriate sample, and/or by using regressions adjusting for unobservable fixed effects. With regards to instrumental variables, other variables can be added to the estimation procedure so as to reduce the biasedness of the parameter estimates. These instrumental variables should preferably be highly correlated with the independent variable of interest, and not be correlated with the error term. Despite the importance of this issue, however, not all studies in Table 1 have chosen to make use of this procedure. For instance, Alston et al (1996), Carter et al (1989), and Roth et al (1994) only make use of ordinary least squares, which can be regarded as a rather simple estimation technique. Smith (2004) and Pender & Kerr (1999) employ a Tobit regression, which is a more advanced technique that in spite of being more advanced fails to adjust the parameter estimates for potential biasedness. Nonetheless, quite a few of the studies in Table 1 have attempted to address this issue by using instrumental variables. In terms of estimation techniques, Foltz (2004) and Carter & Olinto (2003) employ the most advanced technique by utilizing a so-called endogenous switching regression; a type of estimation procedure that builds on the standard framework of maximum likelihood estimators by also accounting for endogeneity. A simpler technique involves the usage of two-stage least squares estimators

where the estimation procedure is divided into two stages. Firstly, the variable of interest is regressed upon the instrumental variables to generate predicted values of the variable of interest. Thereafter, the dependent variable is regressed upon the predicted values. This estimation technique have for instance been employed in the studies by Moor & Nieuwoudt (1998), Li et al (2000), and Zikhali (2008) by using two-stage least squares, as well as by Twerefou et al (2011) that make use of the two-stage conditional maximum likelihood estimator. An alternative, and possibly simpler, approach would be to directly use the instrumental variables as control variables in the estimation procedure, which has been done by for example Deininger & Jin (2006), Feder et al (1988), and Bellemare (2013). Yet, finding suitable instrumental variables is not an easy task. Nor is the detection of endogeneity. Studies have, nevertheless, put forward solutions to both of these problems. Concerning the detection of endogeneity, Pender et al (2006) note that Hausman tests can be performed in order to test between an instrumental variable estimator and ordinary least squares. Moreover, Brück (2003) highlight some useful diagnostic tests, including the Durbin-Wu-Hausman test and the Davidson-MacKinnon test for over-identification; both tests being very useful as a researcher thereby can be more certain about whether an instrumental variables approach needs to be employed. In reference to finding suitable instrumental variables, predominantly two studies excel. Feder et al (1988) use instrumental variables that take into account the land quality, inter alia the type of soil, the length of travel time to the nearest market, whether there is access to irrigation, and whether a household's land is located on a slope. Bellemare (2013) provide an additional set of suitable variables that can be used as instruments, more specifically precise soil quality measurements, including the percentages of carbon, potassium, nitrogen, and clay in the soil, as well as factors such as soil pH and soil color. Still, collecting data on each of these factors can be both time-consuming and costly. A reason that instrumental variables need to be used is that the researcher might have chosen a sample where many of the factors highlighted by Feder et al (1988) and Bellemare (2013) vary across households. Hence, in technical terms, the sample is characterized by heterogeneity. A researcher may therefore in lieu desire to choose a more homogenous sample in order to minimize the amount of instrumental variables that need to be included for the elimination of endogeneity (Pande & Udry, 2006; Goldstein & Udry, 2008). The argument above concerning the preference for micro approaches in analyses of land rights institutions therefore also deserves merit since the probability of encountering endogeneity in a sample subsequently is reduced. The alternative, as highlighted above, would be to make use of regressions adjusting for unobservable fixed effects; the reason being that such regressions eliminate the variation

stemming from time-invariant variables, i.e. factors that tend to change very slightly or nothing over time. This way of addressing the issue pertaining to endogeneity does require the collection of panel data rather than cross-sectional data, which may be time-consuming. Nonetheless, the advantage is that many of the factors that otherwise would have deemed necessary the usage of instrumental variables thereby can be disregarded. For this reason, such regressions have been employed in a few studies, for instance by van den Broeck et al (2007) that use the fixed effects estimator, by Jacoby & Minten (2005) that utilize a fixed effects version of the linear probability model, and by Do & Iyer (2008) that make use of the differences-in-differences estimator. In sum should the usage of all the three procedures – i.e. to use instrumental variables, by carefully choosing an appropriate sample, and/or by using regressions adjusting for unobservable fixed effects – lead a researcher to produce less biased parameter estimates, therefore enabling the researcher to draw more sound conclusions regarding the effect of formal land rights security on agricultural productivity.

The third issue involves the mechanisms through which productivity-enhancing investments may increase. The theory part of this thesis highlighted that more secure formal land rights have the possibility of increasing agricultural productivity by dint of three effects, namely the investment-demand, the transactions, and the credit-supply effects. The first of these effects is induced by an increase in farmers' incentives to invest due to more secure formal land rights, the second effect generally enables land transfer and/or leasing from less to more productive farmers, while more secure formal land rights in case of the third effect implies that more credit becomes available to farmers since land becomes a more legitimate collateral. As has been argued in a few studies, it might be important to disentangle the investment-demand, transactions, and credit-supply effects (Besley, 1995; Feder et al, 1988; Carter et al, 1989; Pender & Kerr, 1999; Carter & Olinto, 2003). A reason is that in some contexts, where farmers may be inclined to demand more productivity-enhancing investments as a result of more secure formal land rights, credit may not be readily available (Guirkinger & Boucher, 2007). Therefore, when farmers do not dispose of the required capital to undertake productivity-enhancing investments by themselves, such investments do not necessarily increase as a result of more secure formal land rights owing to that farmers are unable to make loans to realize their investments. Additionally, leasing markets may function imperfectly which implies that allocative efficiency is inhibited, i.e. the transactions effect may not be realized since farmers to a great extent are unable to lease and/or lease out land plots (Pender & Kerr, 1999). Due to these issues, the implication is that studies that do not separate the

three mechanisms may reject that more secure formal land rights have a positive effect on agricultural productivity, even though farmers in fact have an incentive to invest more. However, only four of the studies in Table 1 have addressed this issue. Pender & Kerr (1999) explicitly test whether more secure formal land rights affect productivity-enhancing investments positively through all three of the mechanisms. Carter & Olinto (2003) evaluate the credit-supply and investment-demand effects, Foltz (2004) focuses only on the credit-supply effect, whereas Roth et al (1994) delimit their study to the investment-demand effect.

Still, all of the three mechanisms through which productivity-enhancing investments increase should, as in the study by Pender & Kerr (1999), be taken into consideration in order to draw useful conclusions. It might be the case that an implementation of more secure formal land rights would be adequate in a certain context due to that land has become sufficiently scarce. If farmers then are credit-constrained, i.e. credit is to a considerable degree unavailable, and if leasing markets are imperfect, land rights formalization would then also have to be accompanied by a creation or stimulation of credit and leasing markets. Hence, by addressing the issue concerning the three mechanisms through which productivity-enhancing investments occur, studies could provide more useful insights regarding the appropriateness as well as the nature of land rights reforms.

The fourth issue entails how studies have chosen to address the relationship between the security of formal land rights and agricultural productivity. As emphasized above, studies can be divided into three groups; the first group focuses only on the effects on productivity-enhancing investments, the second group skips the investments and jumps directly to the effects on agricultural productivity, and the third groups addresses the effects on both productivity-enhancing investments and agricultural productivity. In particular one study provides a compelling argument for why the third group of studies is superior to the rest. Smith (2004: 1641) contends that despite that increased land rights security “associates with increased fixed investments, the latter do not generally cause increased [agricultural] productivity in turn.” Since Smith’s (2004) definition of fixed investments encompasses investments that typically can be regarded as productivity-enhancing, such as manure and crop rotation schemes, the study provides a fair warning of why studies should seek to investigate the effects of more secure formal land rights on both productivity-enhancing investments and agricultural productivity. Yet, only six of the studies in Table 1 have taken into account the effects on both of the afore-mentioned factors (Smith, 2004; Moor &

Nieuwoudt, 1998; Holden et al, 2009; Li et al, 2000; Feder et al, 1988; Jacoby & Minten, 2005). Thus, since the studies that constitute the first group disregard the importance of also analyzing the effect on agricultural productivity – also constituting the biggest group of studies (Deininger & Chamorro, 2004; Deininger & Jin, 2006; Alston et al, 1996; Carter & Olinto, 2003; Pender et al, 2006; Pender & Kerr, 1999; Johnson, 1998; Twerefou et al, 2011; Hagos, 2012; Foltz, 2004; Roth et al, 1994) – the same group of studies hamper the comparability between the studies in Table 1. Studies should therefore seek to account for the effects on both productivity-enhancing investments and agricultural productivity in order to a greater extent convince the reader about whether the relationship running from more secure formal land rights to agricultural productivity holds.

A fifth issue concerns how different investment types have been accounted for in each study. Studies have included a wide range of productivity-enhancing investment types, and as the arguments in theory part of this thesis predicted, all types of productivity-enhancing investments may increase as a result of more secure formal land rights in a land scarce context. The issue, however, is that some studies have paid little attention to disentangle the effects of more secure formal land rights on particular types of productivity-enhancing investments. A useful example to illustrate the issue is the study by Hagos (2012) that analyzes the effects of formal land rights on soil conservation as well as water conservation. The study does, nonetheless, not distinguish between investment types in the estimation procedure but merely lumps together the investments into one measure. A resembling example can be found in Foltz (2004: 237) where investments in new technologies, manure, and irrigation are collected under one single term, namely “farm investments.” Hence, since the dependent variable in both of these cases is constituted by multiple types of productivity-enhancing investments when undertaking regressions, the impact of more secure formal land rights – which then is the independent variable of interest – on particular types of productivity-enhancing investments is obscured. It might be the case that the reader does not regard this topic as an issue. The fact is, nevertheless, that only theoretical arguments can underpin why all types of productivity-enhancing investments would increase due to more secure formal land rights under land scarcity. Studies should hence endeavor to rule out that the rejection or non-rejection of this hypothesis varies across productivity-enhancing investment types. In Table 1, several studies can be regarded as following this recommendation. Johnson (1998) and Twerefou et al (2011) explicitly focus on the impact of more secure formal land rights on irrigation. Roth et al (1994) make a distinction between the

effects on various types of productivity-enhancing investments, including bunding and leveling. Holden et al (2009) separates the effect on soil conservation, on the maintenance or improvement of soil conservation structures, and on trees. Jacoby & Minten (2005) disentangle the effects on irrigation, protective bunds, and land leveling. Additionally, one of the most impressive studies with regards to distinguishing investment types is the study conducted by Li et al (2000) that disentangles the effects on inter alia the usage of organic fertilizer, phosphate fertilizers, nitrogen fertilizers, and draft animal services. Nonetheless, in spite of these latter studies, there appears to be little continuity in the investment types that have been chosen in the studies in Table 1 as the investment types tend to vary across the studies. In short should studies therefore both disentangle the effects on various types of productivity-enhancing investments, as well as using a broader set of investment types since that would increase the possibility of comparison between studies, and possibly rule out that the hypothesis in the theory part of this thesis needs to be revised with regards to different types of productivity-enhancing investments.

The sixth issue involves the measurement of agricultural productivity. The naïve analysis being conducted above masks that agricultural productivity may be defined in different ways. In the studies in Table 1, two definitions have been used. According to the first of these definitions, agricultural productivity is measured as the volume of agricultural output per land area. Most of the studies in Table 1 have calculated agricultural productivity by dint of this definition, thereby letting the calculated results constitute the dependent variable in the undertaken estimation procedures (Bellemare, 2013; Smith, 2004; Migot-Adholla et al, 1991; Moor & Nieuwoudt, 1998; Carter et al, 1989; Zikhali, 2008; van den Broeck et al, 2007; Holden et al, 2009; Li et al, 2000; Dlamini & Masuku, 2011; Feder et al, 1988). According to the second definition, agricultural productivity is calculated as the value of agricultural output per land area. In contrast to the case regarding the first definition, only two studies have utilized measures being similar to the second definition when measuring agricultural productivity, namely the studies by Do & Iyer (2008) and Jacoby & Minten (2005), and it might be argued that the second definition is better than the first. Assuming that a context is characterized by land scarcity, more secure formal land rights should lead to that agricultural productivity increases by dint of the investment-demand, transactions, and credit-supply effects referred to above. Still, there is a possibility that farmers experience an agricultural productivity increase in terms of the volume of agricultural output, but not in terms of the value, thereby not leaving farmers better off. This argument has striking implications,

especially when considering the issue concerning the types of productivity-enhancing investments referred to above. That the value of agricultural output does not increase when formal land rights become more secure, in spite of that the volume increases, might stem from that farmers have undertaken inadequate types of productivity-enhancing investments; some types of productivity-enhancing investments may lead to an increased volume and value of agricultural output, whereas other investment types may only lead to an increased volume. Nonetheless, a comparison between agricultural productivity measures cannot be made unless both definitions are used. It might also be argued that agricultural productivity could be defined in terms of labor productivity since that would capture the marginal productivity of each farmer, and thereby reflect the value of work that each farmer undertakes. Still, this definition has not been used in any of the studies in Table 1. By these means, the thesis recommends the usage of multiple definitions of agricultural productivity. The reason is that, when comparing the estimation results when using multiple definitions, it is possible to draw conclusions regarding the adequacy of the productivity-enhancing investments undertaken by farmers in particular contexts, further calling for that land rights reforms may have to include an agricultural technology package provided to farmers so as to assure that they will be better off. This argument is also important in the sense that the main goal of land right reforms is to reduce poverty, whereby this goal would be unattained if the volume, and not the value, of agricultural output per land area would increase. In brief, since land might be sufficiently scarce for more secure formal land rights to increase agricultural productivity in terms of volume, additional definitions of agricultural productivity than the one pertaining to the volume should be used so as to provide deeper insights, especially regarding whether land rights reforms also should constitute an agricultural technology package that could ensure that farmers reap the benefits of their productivity-enhancing investments, i.e. also the value of their production increases.

There is also a seventh issue; an issue relating to the measurement of formal land rights security. As earlier argued, a proof of land ownership often involves that a farmer disposes of a title. The disposal of a title should grant the farmer the rights referred to in the theory part of this thesis – i.e. using, alteration, profit, selling and exclusion rights – as well as the enforcement of these rights. Commonly, however, not all farmers dispose of titles, meaning that farmers disposing of titles are likely to benefit from more secure formal land rights than farmers without titles. Since the disposal of a title thereby can be considered as a proxy for the afore-mentioned rights and their enforcement, the majority of the studies in Table 1 have

made use of a title dummy as a measure for formal land rights security, in which the dummy variable typically takes the value of 1 if the farmer possesses a title, and the value of 0 if otherwise. This approach may be regarded as very convenient as it only requires the measurement of one single variable so as to arrive at conclusions concerning whether more secure formal land rights have a positive effect on agricultural productivity. Yet, as noted by several authors, the convenience of the title dummy also comes at a considerable price. By drawing on Herbst (2000) and Fafchamps & Minten (2001), Bellemare (2013: 272-273) argues that “[i]n several countries, a land title is often worth no more than the paper it is printed on, either because the state has failed to broadcast its power to remote rural areas ... or because the transaction costs involved in defending one’s claim to a plot of land through the legal system are prohibitively high.” What this statement implies is that a title may not have any practical value since the enforcement costs associated with a title are too high. Moor & Nieuwoudt (1998: 611) refers to Roth et al (1994) and Carter et al (1989) to further reinforce this point by arguing that “evidence from titling program[s] in Africa suggest that title registration is not necessarily synonymous with [land rights] security” as well as by stating that “if the formal land code is ambiguous in its definition of rights, and if legal procedures to settle disputes are vague, [farmers] may not perceive an increase in [land rights] security following registration of title.” Additionally, West & Myers (1992: 2) argue that “[t]itling may help farmers to acquire commercial credit ... but is useless where title is not acceptable as collateral.” As all of these arguments disapprove of the usage of a title dummy as a proxy for formal land rights security, better proxies need to be utilized. Some of the studies in Table 1 have sought to make use of such proxies. Alston et al (1996) attempt to use the transferability, i.e. selling rights, as a proxy for formal land rights security. Nonetheless, since also Alston et al (1996) use the possession of a title as a proxy, the study does in fact proxy all of the other rights at the same time. The implication is thus that the usage of title as a proxy cannot only be regarded as inappropriate per se, but it also obscures the effect of various types of rights on agricultural productivity. This argument is also important due to the possibility that not all types of rights may be formal, but some rights in the land rights bundle might be informal, whereby this issue also is obscured when using title as a proxy; the reason being that the title may not cover all types of rights in the land rights bundle. Hence should studies, as also argued in the context of investments above, seek to disentangle the effects of various types of rights – as well as their enforcement – on agricultural productivity so as to rule out a revision of the hypothesis that all types of rights are conducive to productivity-enhancing investments under the condition that land is relatively scarce. One step in the right direction in this regard

is the study by Twerefou et al (2011) that only addresses the type of land rights that in this thesis have been denominated as selling rights. Still, some studies take this argument even further by analyzing the perceptions of formal land rights as well as by decomposing these rights into its individual components. With regards to perceived land rights, Dercon & Ayalew (2007: 10) highlight that “when researching the consequences of particular land rights in terms of investment and efficiency, it is perceived rights that will govern behavi[o]r.” As also implicitly noted by Bellemare (2013) above, a farmer needs to be aware of that his or her security of formal land rights has changed, because otherwise, investment incentives are unlikely to alter, whereby analyses of perceived formal land rights security are more appropriate than analyzing de jure formal land rights (Dercon & Krishnan, 2010). Six studies in Table 1 have therefore been devoted to analyze perceived formal land rights security by explicitly asking farmers about their perceptions. Deininger & Jin (2006) utilize two measures of perceived formal land rights security by proxying for perceived risk of land redistribution – thereby proxying for enforcement – as well as for the perceived ability of households to mortgage or sell land, hence proxying for selling rights. Resembling measurements of perceived formal land rights security have been carried out in the studies by Li et al (2000), Hagos (2012), and Pender et al (2006). Furthermore, Moor & Nieuwoudt (1998) use a particularly broad definition of formal land rights security by including the breadth, duration and assurance of rights; the breadth includes exclusion, use and transfer rights, the duration refers to the length of time for which the three rights are valid, while the assurance “defines the degree of certainty with which legal definitions of breadth and duration are held” (Moor & Nieuwoudt, 1998: 612; referring to Place et al [1994: 20]). However, since the breadth, duration and assurance later are weighted into a single index, the study does not explore the effects of various types of rights on agricultural productivity. Similarly is the case in the study by Roth et al (1994). Nonetheless does the study by Roth et al (1994) make use of a five-point scale when measuring perceived formal land rights security, implying that the study utilizes a consistent device to capture the perceptions of farmers. Since farmers’ perceptions hence are expected to vary despite that de jure formal land rights may be invariant across households in a certain context, the problem that earlier was mentioned in reference to the variation in the security of formal land rights between households also is expected to disappear, thereby not causing parameter estimates to be downward biased. In other words are studies subsequently more likely to draw reliable conclusions regarding the effect of formal land rights security on agricultural productivity. Thus, so as to maximize the possibility of comparison between studies, studies should address the issue concerning how formal land rights security is

measured in two ways. Firstly, studies should utilize a consistent device – e.g. a five-point scale – so as to measure perceived rather than de jure formal land rights security. Secondly, studies should seek to disentangle the effects of various types of rights on agricultural productivity.

An eighth issue – also being the last – involves the measurement capturing factor endowments. In the naïve analysis above, an attempt was made to construct a measure capturing factor endowments by calculating the population density pertaining to agriculture. This measure did not only exhibit the drawback of including temporary meadows for mowing and pastures, and land temporarily in fallow, but the figures generated for the studies in Table 1 did not adequately represent the study areas for which the studies accounted. In order to expect an adequate representation of population densities in the study areas, data on agricultural population densities in each of the studies would be required. Yet, such data is not readily available. A problem that further complicates the analysis is that the studies in Table 1 have been extremely vague about the concept of population density. Only two of the studies make any reference with regards to the relative scarcity or abundance of land. Pender et al (2006: 170-171) highlight that their “study region included most of Uganda, including more densely populated and more secure areas in the southwest, central, eastern, and parts of northern Uganda.” Yet, this comment does not provide much information for a reader since the study does not construct relevant sub-samples. Put differently, the study does not break down its estimation procedure into densely and less densely populated areas. Also, in the study analyzing Rwanda, Ghana and Kenya, Migot-Adholla et al (1991: 160) state that “Ghana was chosen to represent a situation of relative land abundance, whereas Rwanda represents a case of [relative] land scarcity.” Furthermore, the study by Besley (1995: 913) that was referred to earlier highlights in the study of two Ghanaian regions that “[t]he population density in [Anloga] is much higher than in Wassu.” These two latter studies thereby clarify to a greater extent what might be expected in terms of findings since references are made to factor endowments. In spite of these clarifications, however, the weak attempts to address the measurement of factor endowments lead this thesis to ask what kind of population density to which earlier studies have been referring. The studies might refer to the population density in their study areas as a whole, or to the population density that solely pertains to agriculture. Nevertheless, since no indications are provided with regards to what is meant by population density, it becomes difficult to state anything particular about whether factor endowments are explanatory. Hence, to combat this issue, the thesis suggests that a

resembling methodology as recommended with regards to the measurement of formal land rights security is required, namely by using a consistent device – e.g. a five-point scale – to capture farmers’ perceptions of factor endowments. As argued above, it is the perceived security of formal land rights that governs a farmer’s behavior, i.e. his or her incentive to invest. Likewise could be argued about factor endowments. Farmers perceiving land to be scarce (abundant) are likely to have more (fewer) incentives to undertake productivity-enhancing investments, because in light of the afore-mentioned argument concerning perceived formal land rights security, it might be contended that incentives tend not to be formed by how the world in reality looks, but rather by how the world is perceived. Moreover, the usage of a consistent device makes it possible to break down samples into relevant sub-samples ranging from the households with the most land scarce perceptions to the most land abundant perceptions. Thereby could the usage of for instance a five-point scale as a consistent device result in that five sub-samples are constructed, from which reasonable conclusions not only could be drawn with regards to the relationship between formal land rights security and agricultural productivity, but also with regards to the explanatory power of factor endowments. Due to these reasons, this thesis argues that the usage of a consistent device is one of the most appropriate manners in which factor endowments can be taken consideration in land rights studies, because even though that a consistent device might not imply full comparability between studies, it could at least offer insights regarding whether factor endowments constitute an explanation, and thereby also provide useful conclusions regarding the adequacy of land rights reforms in particular contexts.

In sum, all of the eight issues that this section highlights need to be properly addressed so as to enable useful inferences regarding whether factor endowments can explain the divergent findings of the studies in Table 1. Firstly, studies should not endeavor to use nationally representative samples as there is evidence of heterogenous effects stemming from more secure formal land rights; an alteration in formal land rights security affect households differently within countries. Secondly, endogeneity must be addressed; by using instrumental variables regressions, by carefully choosing an appropriate sample, and/or by using regressions adjusting for unobservable fixed effects. Otherwise, the estimated effect of more secure formal land rights on agricultural productivity may be biased, potentially leading to the conclusion that formal land rights security is conducive to productivity-enhancing investments, and hence increased agricultural productivity, when it is not and vice versa. Thirdly, investment-demand, transactions, and credit-supply mechanisms need to be

disentangled. A reason is that farmers that demand more productivity-enhancing investments as a result of more secure formal land rights may not possess the required capital to undertake such investments, whereby a functioning credit market need to supply the demanded amount of credit to farmers. Another reason is that leasing markets may be imperfect, meaning that farmers to a great extent are unable to lease and/or lease out land plots. These issues have two important implications. The first implication is that the factor endowments explanation – if it in the future would be indicated to hold – needs to account for whether farmers have readily access credit as well as if farmers are able to lease and/or lease out land plots. The second implication is that land rights reforms also might have to be accompanied by a creation or stimulation of credit and leasing markets. Fourthly, both of the effects stemming from more secure formal land rights, i.e. on productivity-enhancing investments and agricultural productivity, should be studied since evidence has indicated that investments that typically are associated with increased productivity do not necessarily induce an agricultural productivity increase. Therefore, the whole relationship, running from more secure formal land rights to productivity-enhancing investments, and in turn to agricultural productivity, should to be considered. Fifthly, studies should seek to disentangle the effects of more secure formal land rights on different types of productivity-enhancing investments, as well as endeavor to utilize a broader set of investment types. The argument for addressing this issue is that it could rule out that the hypothesis concerning the relationship between formal land rights security and productivity-enhancing investments, and thereby agricultural productivity, needs to be revised. Sixthly, multiple definitions should be used when measuring agricultural productivity. Sufficient relative scarcity of land is hypothesized to make formal land rights security conducive to agricultural productivity. However, as the agricultural productivity only in terms of volume may increase, multiple definitions of agricultural productivity ought to be used; more than one measure can provide insights regarding whether land rights reforms also should constitute an agricultural technology package that could ensure that farmers reap the economic benefits of their productivity-enhancing investments. Seventhly, studies should attempt to address the measurement of formal land rights security in two ways; firstly by disentangling the effects of various types of rights on agricultural productivity, owing to the same reason as in the fifth issue, and secondly by making use of perceived rather than de jure formal land rights security through using a consistent device as it is perceived land rights that govern behavior. Lastly, the thesis suggests that a consistent device also should be used for the measurement of factor endowments due to that perceived, and not actual, factor endowments might be influencing a farmer's investment decisions.

Since none of the studies have addressed all of the eight issues, thereby also obstructing the comparability between the studies in Table 1, clear conclusions cannot be drawn with regards to the explanatory power of factor endowments. In reference to the above-mentioned issues, however, the thesis argues that a factor endowments explanation at least should be accompanied by considering the existence of credit and leasing markets as well as by taking into account the adequacy of agricultural technologies in particular contexts, because as argued earlier, these three factors could potentially constitute important considerations for future land rights reforms.

4. Conclusion

This thesis began by arguing that studies that have evaluated the relationship between formal land rights security and agricultural productivity have arrived at divergent findings, as well as that factor endowments possibly could bridge the gap between these findings. The ensuing section of the thesis then theorized about the above-mentioned relationship by putting the land rights debate into the context of new institutional economics, more precisely into Williamson's (1994, 2000) multi-level model of economic systems. This part of the thesis contended that both the institutional environment and the embeddedness of institutions need to be considered when addressing land rights institutions together with factor endowments. Afterwards, in the empirical analysis, the thesis first carried out a naïve analysis by comparing the findings of 24 studies, whereby factor endowments were disconfirmed as an explanation. It was later argued, however, that the naïve analysis could be rejected altogether, and that in order to draw useful conclusions with regards to the relevant relationship, eight issues needed to be addressed with the following measures:

1. Representativeness of samples: Micro rather than macro approaches should be used.
2. Endogeneity: By utilizing instrumental variables regressions, carefully choosing an appropriate sample, and/or regressions adjusting for unobservable fixed effects.
3. Investment-demand, transactions, and credit-supply mechanisms: Need to be disentangled in estimation procedures.
4. The effect of more secure formal land rights: Effects on both productivity-enhancing investments and agricultural productivity should be included.
5. Productivity-enhancing investments types: A broader set of investment types should be used, and investment types need to be distinguished in estimation procedures.
6. Defining agricultural productivity: Multiple definitions should be used, including the volume and the value of agricultural output per land area etc.
7. Proxying for formal land rights security: Data on the perceptions of formal land rights security should be collected by using a consistent device, and the effect of various types of perceived rights should be distinguished in estimation procedures.
8. Measuring factor endowments: Data on the perceptions of factor endowments, i.e. relative land abundance or scarcity, should be collected by dint of a consistent device, and thereafter should samples be divided into sub-samples in accordance to these perceptions.

Thus, addressing the research question in light of the above-mentioned issues, the only answer that the thesis can provide in terms of factor endowments' explanatory power is that factor endowments possibly could explain the divergent findings, yet not alone. As this thesis demonstrates, drawing useful conclusions with regards to factor endowments is a perplexing task provided the various drawbacks that obstruct the comparability of earlier studies. In other words, the thesis argues that the relationship between formal land rights security and agricultural productivity – when accounting for factor endowments – still is a rather unclear, and that studies therefore ought to address this topic more rigorously. Nevertheless, in order to account for the relationship running from formal land rights security to agricultural productivity, there are at least three other topics than factor endowments that deserve consideration. Firstly, the existence of credit markets should be analyzed since the credit-supply effect otherwise may not be realized owing to that farmers may not possess the capital to undertake productivity-enhancing investments themselves. Secondly, for the transactions effect to be realized, the presence of leasing markets is key or else the transfer of land from less to more productive farmers may be impeded. Lastly, whether the value, and therefore not only the volume, of agricultural output per land area increases owing to more secure formal land rights needs to be taken into account, because that could provide useful indications of the appropriateness of agricultural technologies utilized and invested in by farmers.

Moreover, due to the drawbacks of earlier studies, it also becomes difficult to draw useful conclusions considering the nature of future land rights reforms. Yet, this argument does not rule out that the thesis can make an educated speculation. According to what the thesis earlier has argued, it may be inferred that there are at least four possible factors about which policy-makers should think carefully; that is if land rights reforms should be considered at all. Firstly, land rights reforms should not be designed in a way that brings about uniform changes in land rights institutions across a country since there are indications of heterogenous effects stemming from such reforms. In layman's terms, all farmers across a country are not expected to alter their behavior identically as a result of more secure formal land rights. For this reason, within-country variation should be considered when designing land rights reforms. Secondly, land rights reforms may have to be accompanied by the creation or stimulation of credit markets in order to assure that farmers readily can access required capital to undertake productivity-enhancing investments. Thirdly, leasing markets might constitute an important consideration for land rights reforms since more productive farmers would be more enabled to get access to land when leasing markets are less imperfect. As such a consideration not only

could lead to that agricultural productivity on average increases, but also might imply that the more productive farmers raise their consumption, multiplier effects could be set off within a country's economy, potentially raising the economic welfare of a whole country's inhabitants. Lastly, an agricultural technology package may have to be included in land rights reforms, since in certain contexts, it might prove that certain types of productivity-enhancing investments only may raise the volume, but not the value, of agricultural output per land area.

The debate on land rights reforms has been ongoing for more than two decades, and it is, indeed, with great concern this thesis concludes that it yet is unclear whether factor endowments can explain the divergent findings with regards to formal land rights security and agricultural productivity; particularly when considering that the economic welfare of poor households in developing countries may depend on the conclusions drawn in land rights studies. This thesis does, however, provide insights that possibly could bring an end to this debate; that is by pointing to the above-mentioned issues. It would, of course, be rash to presume that a one-dimensional explanation such as factor endowments could explain why land rights reforms are likely to fail in land abundant contexts, especially since this thesis contends that a factor endowments explanation at least should be accompanied by considering the existence of credit and leasing markets, as well as by taking into account the adequacy of utilized agricultural technologies in particular contexts. Furthermore, even though the thesis arrives at findings that contribute to useful insights, which in turn have the possibility to improve policy-making with regards to land rights, the findings in this thesis may in the end not be applicable to all countries. In some countries, agriculture might constitute a negligible part of their respective gross domestic products, for instance due to that the countries have attained a high gross domestic product per capita. This argument, in turn, implies that some countries already could have moved beyond an agriculture-based economy as a result of structural transformation. Subsequently may the land rights debate not be of relevance to these countries, because land right reforms in such countries are likely to not be very cost-effective. Additionally, other institutional arrangements than the ones governing land rights may matter for land use, and hence also for agricultural productivity. What these institutional arrangements entail is, however, outside the scope of this study. Consequently ought the afore-mentioned topics to constitute important issues that future research also should aim to investigate further. Nonetheless, as land over time is becoming more and more relatively scarce, it is the hope of this thesis that factor endowments in the future at least could provide some guidance for policy-makers in the combat against poverty.

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