Mercator Research Institute on
Global Commons and Climate Change
(MCC) gemeinnützige GmbH

Fiscal Instruments for Sustainable Development: The Case of Land Taxes

Matthias Kalkuhl, Blanca Fernandez Milan, Gregor Schwerhoff,
Michael Jakob, Maren Hahnen and Felix Creutzig

Corresponding author:
Matthias Kalkuhl
kalkuhl@mcc-berlin.net

3 March 2017

Mercator Research Institute on Global Commons and Climate Change (MCC) gGmbH
Torgauer Str. 12 – 15, 10829 Berlin, Germany

Acknowledgments. We would like to thank Ira Dorband, Anne Gläser, Athene Cook, Thang Dao Nguyen and Filip Schaffitzel for their research assistance as well as Jetske Bouma and Stefan van der Esch, PBL Netherlands Environmental Assessment Agency, for their helpful comments and suggestions. We further thank Ildephonse Musafiri (University of Rwanda) and Deden Dinar (Diponegoro University, Indonesia) for reviewing the respective case studies and Sabine Fuss (MCC Berlin) and Joan Youngman (Lincoln Institute of Land Policy, USA) for reviewing the whole report. We acknowledge funding from PBL Netherlands Environmental Assessment Agency.

Abstract

Economists argue that land rent taxation is an ideal form of taxation as it causes no deadweight losses and has therefore no adverse effects on growth. Nevertheless, pure land rent taxation is rarely applied and, if so, revenues collected remain rather small. Property taxes share some of the characteristics of land taxes and generate small revenues, inter alia also in developing countries. This report revisits the case of land taxation for developing countries that are often characterized by large informal sectors, low public spending and poor tax or land administration institutions. We first provide a comprehensive overview of direct and indirect welfare and development effects of land rent taxation, ranging from increased efficiency in the fiscal system and in financing infrastructure, over environmental effects due to changes in land use to distributional effects. Barriers and constraints of implementing land taxes are also discussed, particularly the existence of a land registry, the role of administrative costs, compliance, evasion and political economy aspects. We extend this review with an in-depth analysis of current land tax systems and reform options in six case study countries. For four countries, we provide an additional quantitative analysis based on micro-simulations with household data that allow us to quantify revenues and distributional effects of various land tax regimes. Our main finding is that land taxes provide a large and untapped potential for financing governments. Formalizing and securing land tenure by establishing a land registry is a pre-condition that further provides substantial co-benefits for various sustainable development objectives. Widespread concerns regarding the feasibility and costs of implementing land taxes are rarely valid, as land taxes are in these aspects comparable to other taxes. Political will and investment in the quality of administration are, however, decisive. Considering some key principles in designing the land tax can help reduce administrative costs, avoid adverse distributional effects and increase compliance.

Foreword

Land is central to many of today's policy questions and increasingly recognized as such. Projections of a strongly increasing demand for land-based products, increased claims on land for bio-energy and urban expansion and the acknowledgment that land is needed to conserve biodiversity and mitigate climate change are leading to increased scarcity. The recent initiative by the UN Convention to Combat Desertification (UNCCD) to develop a Global Land Outlook seeks to highlight these challenges and find ways to improve global land use efficiency.

Land taxes are not the first thing policymakers think of when considering interventions to improve global land use efficiency. To the contrary, land taxes are almost automatically assumed too complicated to implement, aggravated by uncertainties on their potential distributional effects. This holds for both developed and developing countries, international cooperation being potentially very useful in this domain.

The aim of this report is to assess the potential of land taxes and provide policymakers with an idea of their potential impact, feasibility, and barriers to implement. In this, we pay attention to the potential costs and benefits of land tax implementation, the possible distributional impacts, and the feasibility of introducing land taxes as well. The report does not pay attention to political feasibility, which is highly context specific and about which few general statements can be made.

The outcomes indicate that in many countries the introduction of land taxes would not only be feasible but an efficient and effective form of taxation, limiting distortions to economic decisions and providing a stable tax base. Distributional consequences are manageable and no more difficult than for other taxes, for example by exempting part of the land rents from the tax. Moreover, land taxes may help in incentivizing more efficient and sustainable use of land. With the global community committed to supporting developing countries in strengthening their capacity for domestic revenue mobilization (Addis Ababa declaration 2015), this report strengthens the case to make land taxes part of that effort.

It is important to note that the study, which we commissioned to the Mercator Research Institute on Global Commons and Climate Change, is really a first assessment of the order of magnitude of potential effects and impacts of land taxes, and exploration of the factors constraining land tax implementation and feasibility.

For us, the report is an important building block in our aim to explore effective pathways for stimulating Inclusive Green Growth in international cooperation, and contributes to the analysis of intervention strategies for the Global Land Outlook, in which PBL cooperates with the UNCCD.

We hope you will appreciate this report's findings as much as we did.

Jetske Bouma & Stefan van der Esch

PBL Netherlands Environmental Assessment Agency

PBL Netherlands Environmental Assessment Agency is the Dutch national institute for strategic policy analysis in the fields of the environment, nature and spatial planning.

PBL Netherlands Environmental Assessment Agency

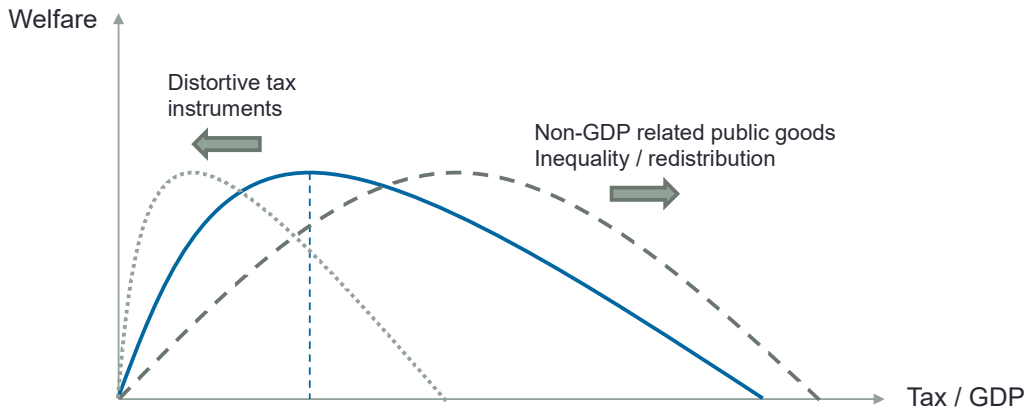
Table of Contents

1. Introduction

Land rent taxation has been suggested since the days of Adam Smith as an efficient form of taxation since it can be designed in a way that does not distort the supply of the tax base. Conceptually, a rent is the excess amount earned by a factor over the cost necessary to supply it (Wessel 1967). Hence, the land rent constitutes that part of the land rental value or land price that is solely associated with the scarcity of land at a specific location.[1] While the topic of land rent taxation is an old one in economics (A. Smith 1776; Ricardo 1817; George 1879), several important developments of the twenty-first century have renewed interest in it. One of these trends is an increase in the concentration of wealth (Piketty 2014), which has been attributed to a large extent to rents, in particular land rents (Stiglitz 2015). A recent study confirmed that land rents grow substantially stronger than construction costs and constitute an increasing share of housing prices (Knoll, Schularick, and Steger 2017). A second trend is an increasing demand for land due to population growth and new economic uses such as biofuels (Lambin and Meyfroidt 2011; P. Smith et al. 2010; Brend'Amour et al. 2016). A third trend is a decreasing supply of land through degradation (Blaikie and Brookfield 2015) and climate change (Barros et al. 2014) which may further increase land rents if technological change in land use efficiency remains slow.

These new developments are particularly important for developing countries where the agricultural sector has a large share of value added and employment. The aim of this paper is to assess the scope, benefits and caveats of land rent taxation for developing countries. We provide a conceptual analysis based on a comprehensive literature review as well as empirical and institutional in-depth analyses of extended land taxation for selected case study countries.

Figure 1 Optimal size of Government (own depiction)



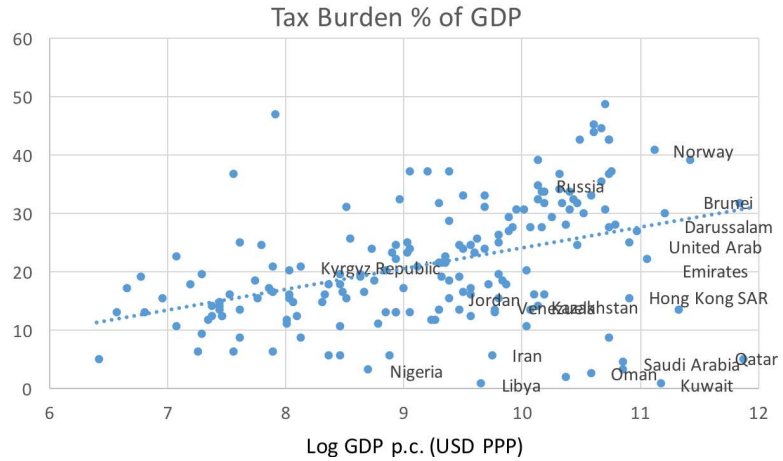
Source: Own illustration based on (Karras 1997). The optimal size of government is lower if the instruments used to raise revenues are highly distortionary and discourage growth. The optimal size of government should increase if public goods and other social goals that require funding are included in the social welfare function.

An important motivation for studying land rent taxation in the context of developing countries constitutes the specific institutional settings that characterize their fiscal systems. Some estimates suggest that the optimal size of government ranges between 20 and 25 percent of GDP (Karras 1997) (see Fig. 1). The optimal size of government is lower if the instruments to raise revenues are highly distortionary and discourage growth. The optimal size of government should increase if public goods and other social goals that require funding are included in the social welfare function. As a typical pattern, the size of government, measured as share of tax revenues on GDP, tends to increase with GDP

[1] In the case of agricultural land, land quality is partly under the control of the land owner which needs special consideration. In that case, the annualized costs of private investments in land quality need to be subtracted from the rental price of land to get the land rent component.

(see dotted regression line in Fig. 2). Countries with a strong role of the state, e.g. formerly planned economies and northern countries, tend to lie above the average relationship. On the other hand, for resource-rich countries where government revenues consist of direct incomes from resource rents, tax to GDP ratios are significantly below the average. The low tax-to-GDP ratios of many developing countries are particularly striking against the financing needs for achieving other social and development objectives that require increased investments (Schlegelmilch, Speck, and Maro 2010). Public investment in infrastructure related to health, education, social security, access to water, sanitation or electricity is at a low level for many African countries (Yepes, Pierce, and Foster 2009). The low tax-to-GDP ratio also reflects the challenge developing countries are facing with respect to weak tax administration, low taxpayer morale, high corruption and a high share of the informal sector (IMF et al. 2011) – all issues that effectively increase the (welfare) cost of raising public revenues through taxes.[2]

Figure 2. Tax burden as share of GDP.



Source: Own illustration based on 2015 macro-economic data from the Heritage Foundation (2015). Countries with large fossil resource exports are labeled.

Economic theory provides a strong case for land rent taxation to improve the efficiency of the economy and the tax system (Oates and Schwab 2009a). This is important, as distortionary taxes have been shown to slow development (Y. Lee and Gordon 2005). Due to their small distorting impact on the economy, land taxes could help increase domestic resource mobilization, which is one of the main goals of the Addis Ababa Action Agenda (United Nations 2015).

Land taxes can be designed in two basic ways, namely as land value taxes or as land unit taxes. The former is a non-distortionary form of taxation, which would allow governments to make less use of distortionary taxes like labor, capital, consumption or trade taxes. The latter would also transfer part of the associated rent to the government budget but may additionally discourage the use of land with a value lower than the unit tax (Brandt 2014; Kalkuhl and Edenhofer 2016). This land with low economic value often has great importance for ecosystem services, in particular for water management.[3] The land-sparing effect of unit taxes could therefore increase welfare if negative externalities are associated with the use of land and open space, an aspect particularly immanent to urban sprawl (Brueckner 2001; Banzhaf and Lavery 2010; Bento, Franco, and Kaffine 2011) but also deforestation (DeFries et al. 2010).

Two further aspects are relevant when assessing the role of land taxes for improving fiscal efficiency, public good provision and incentives for land use: the distributional incidence as well as the institutional feasibility, or costs. If land ownership is concentrated among rich households, or revenues are used in a way that favors the poorest segments of society, a land rent tax would in addition be progressive and directly reduce inequality or poverty. It could, however, also provoke high resistance by well-organized

[2] Other research emphasized that low tax-to-GDP ratios might also be driven by crowding out of development aid (Benedek et al. 2014) although this assertion is also contested (Morrissey 2015).

[3] A comprehensive assessment of services provided by marginal land prepared in the upcoming report "Land degradation and restoration" by the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES).

and influential social groups, thus impeding its effectiveness. Additionally, if the administrative burden of implementing land rent taxation turns out to be excessive, the efficiency advantage of land taxes might be reduced or even lost.

In this paper, we first review in Section 2 the potential of land taxes to increase social welfare by focusing on (i) the fiscal efficiency effects, (ii) the needs for increased government spending for public good provision of high social value, (iii) the possible environmental impacts on land use, and (iv) the distributional implications. Fostering economic growth and public infrastructure as well as reducing environmental externalities, inequality and poverty can be thought of having positive effects on social welfare. We label the effects of land taxes on these dimensions of social welfare as benefits, acknowledging, however, that the precise weighting and prioritizing of these dimensions depend on normative considerations that should be subject to deliberative processes within societies (Jakob and Edenhofer 2014). We contrast these potential benefits with the obstacles to land rent taxation, which are the costs of implementation that arise due to administrative costs for running land registries and assessing land values as well as poor compliance due to weak institutional capacity, in particular, corruption. A synthesis of the literature review is provided at the end of Section 2.

Based on the literature review and conceptual analysis in Section 2, we develop a country typology based on easily accessible proxy indicators for various benefit and cost dimensions. Constructing Pareto frontiers, the typology aims to identify countries with preferential benefit-cost ratios, i.e. where implementing or extending land rent taxation can be expected to be particularly promising.

The typology also provides a transparent way for selecting case-study countries that are analyzed in more detail in Section 4. We assess the distribution of agricultural and urban land rents among household and conduct a micro-simulation of various land tax schemes. The quantitative analysis allows us to estimate the total revenues that could be collected as well as their distributional incidence. We further elaborate on the status quo on land taxes and potential reform options. Finally, Section 5 concludes by summarizing the major insights from the article and outlining major design options and policy recommendations for land tax reforms in developing countries.

2. Literature Review

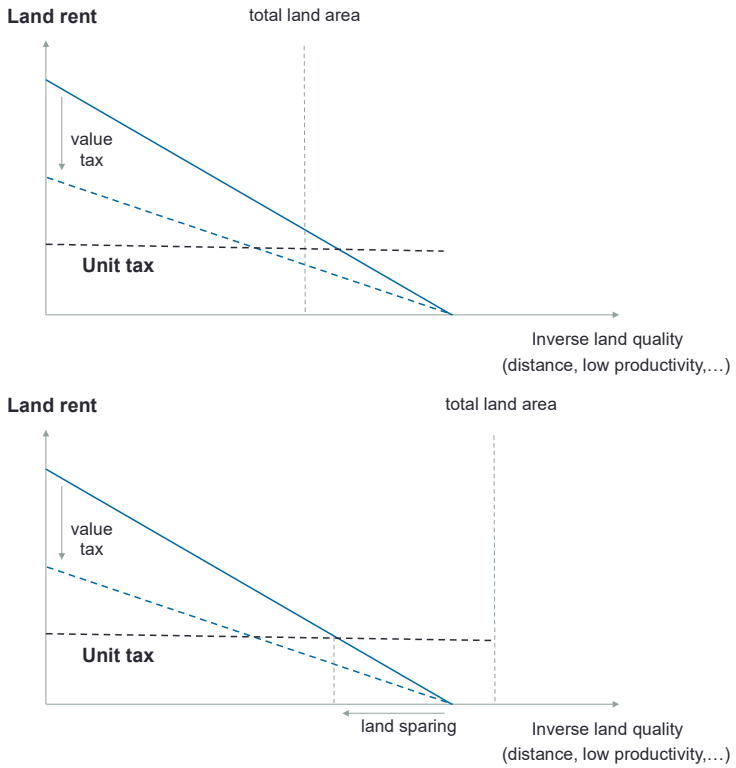
2.1. Land taxes: key definitions and principles

There are two basic types of land taxes: land value taxes and unit taxes (see Fig. 3). As the names indicate, the first is proportional to the value of the land, such that a piece of land of a given size is taxed more at the center of the city than in a remote rural area, while the second taxes all pieces of land of a given size equally. The type of tax to be chosen depends on the objective of the government. When several objectives are pursued simultaneously, the optimal policy could be a mix of the two instruments.

If the land rent constitutes the land value, a land value tax (of less than 100 percent) is non-distorting in the sense of not reducing the tax base. It is for this reason that it is an attractive source of revenue for the government. Contrary to common perception, however, a land value tax is not neutral in the sense of not affecting economic decisions. For land-owning households, the land value tax causes a wealth effect, meaning that both their total expenditure and the composition of expenditure may change. As not all households receive the same share of their income from land rents, land value taxation also has important distributional consequences. Some households are affected more than others. Both the direct effect of these distributional consequences and possible corrections for it need to be understood before a land value tax is implemented.

If land is an open-access resource, a unit tax on land will mean that all land with a marginal productivity below the tax rate will not be acquired (Figure 3) This is particularly relevant if land can be appropriated by clearing and cultivating open-access forest area (Kalkuhl and Edenhofer 2016). A unit tax will in this case not have the non-distortionary property of a land value tax. While the value tax thus corresponds to the government objective of raising government revenue in an efficient way, the unit tax corresponds to environmental or spatial planning objectives.

Figure 3 Unit vs. value tax



Note: The agricultural land rent decreases, e.g., with distance to consumers and wilderness area, or pristine forest, prevails where the land rent becomes zero. Upper panel: Case of land scarcity (no wilderness area); lower panel: Case of land abundance (wilderness area prevails at zero land rent). Source: Adapted from Kalkuhl and Edenhofer 2016.

Table 1. Overview of major land-related taxes

Type of tax	Relation to land rent
Land value tax	Tax on pure land rents (if quality of land is exogenous to landowner)
Unit tax	Tax on pure land rents (tax higher than the land rent is possible)
Property tax	Tax on part of pure land rents Part of the pure land rent plus tax on structures (buildings); equal share.
Split rate tax	Tax on part of pure land rents plus tax on structures (buildings); equal or different shares.
Stamp tax and transaction taxes	Transactions of property - land and structures (buildings). No direct land rent taxation.

More common than land taxes are, however, property and split-rate taxes which tax the land rent as well as the structure on land (including buildings). Property taxes are ad-valorem taxes on the value of a property (land including structure, i.e. a building). Split-rate taxes are differentiated taxes on land and structure with two different tax rates. As these taxes apply additionally to structure, they have an allocative effect by reducing investments in structure.

Table 1 summarizes the major tax types. It also includes taxes on land and property transactions that are widespread but not strongly linked to land rent taxation.

2.2. Efficiency and growth effects

Most countries finance their government budget to a large extent by taxing labor income, capital income and consumption (in the form of value added tax in particular) (Johansson et al. 2008). Since these taxes make it less profitable to provide capital and/or labor, households react by providing less of these production factors. This reaction has been shown to be particularly strong for labor income taxes (Feldstein 1999; Slemrod and Yitzhaki 2002). While labor taxation reduces work incentives in developed countries, labor taxes induce a shift of labor from the formal to the informal sector in developing countries (Ulyssea 2010; Meghir, Narita, and Robin 2015).

A widely used concept to measure the welfare costs of distortionary taxation is the marginal costs of public funds, MCF (Browning 1976). Given a government budget, the MCF measures the tax burden plus the marginal welfare costs associated with a marginal increase in tax revenue while neglecting potential beneficial welfare effects of government spending. Thus, a MCF of one indicates a perfectly efficient tax system, as raising one additional dollar for the government costs only one dollar to society. Estimates of MCFs typically range between 1.2 and 1.5, depending on the country and specific tax considered to raise public revenues (Auriol and Warlters 2012). Hence, raising additional government funds through taxes causes 20 to 50 percent of additional loss in consumer welfare. In a recent study, (Auriol and Warlters 2012) estimate MCFs for 38 African countries, finding that costs are highest for capital and labor taxes (on average 1.60 and 1.51, respectively), then import taxes (average 1.18) and finally domestic consumption taxes (average 1.11).

The supply of land on the other hand is inelastic to a value tax (of less than 100 percent) since it is taxed independent of whether or not it is used in production. This inelastic supply of land makes it an efficient source of taxation, implying a MCF of one (Oates and Schwab 2009a). The non-distortionary nature of land value taxation was originally discovered by Adam Smith and has been analyzed and advocated for by many economists when advising governments on reforming their tax systems (see, e.g. (Mirrlees and Adam 2011) for the UK or (Henry et al. 2009) for Australia).

Economic theory has identified further income and growth effects of land taxation related to households' saving and investment behavior. The first is related to the portfolio effect discovered by (Feldstein 1977): households typically use some of their labor income to save for retirement. These savings are used to purchase assets like capital and land. When land value is taxed, it becomes more attractive to invest in capital and as a consequence, capital accumulates faster. In a situation where capital is under-accumulated, it is welfare increasing to intentionally trigger the portfolio effect (Edenhofer, Mattauch, and Siegmeier 2015). The second effect of land taxes on growth is related to inequality of land ownership. The model of (Galor, Moav, and Vollrath 2009) shows that strong inequality of land ownership has a negative effect on economic development.[4] The reason is that large-scale landowners have an interest in discouraging human capital investments of the rural population in order to keep rural wages low. Reducing land value through taxation might correct these harmful incentives and thus promote growth.

While economic theory is useful for understanding and explaining the mechanisms of how land taxes influence economic development, empirical literature on their relevance is rather scant. One reason is the lack of data, as solid econometric analyses require large variability of land tax schemes over space and time. Property and split-rate taxes are common in practice and are thus more frequently analyzed. While they are not as efficient as taxes on pure land rent, property taxes are considered to be less distortionary

[4] Using a panel on GDP and land inequality data, (Fort 2007) finds evidence that inequality in land ownership affects growth negatively.

than income taxes (OECD 2010). An empirical study on 21 OECD countries from 1971 to 2004 by (Arnold 2008) finds that taxes on immoveable property have the smallest growth reducing effects compared to any other form of taxation (even consumption taxes). In addition, a recent IMF paper (Norregaard 2013) notices the renewed interest in taxes on immovable factors, such as land, and emphasizes that shifting the tax system to more revenue collection from property taxation can indeed spur economic efficiency and growth.

2.3. Environmental and land-use effects

In many countries, the amount of land used for economic purposes extends at the cost of natural ecosystems, in particular forests (DeFries et al. 2010). Ecosystems provide, however, benefits to human well-being as well as economic production (De Groot et al. 2012) and are therefore relevant for social welfare. While the extent of conservation depends on other social goals (Jakob and Edenhofer 2014; Edenhofer et al. 2014), completely neglecting environmental externalities constitutes a welfare loss. A government which intends to preserve these ecosystems could employ a unit tax on agricultural land or deforested land as an instrument to change land use dynamics (Kalkuhl and Edenhofer 2016). Such a land tax could also reduce appropriation of open-access land for agricultural purposes. While agricultural land taxes can help reduce overall pressure on ecosystems, they are likely unable to conserve specific ecosystems or environmental sites. They are therefore best understood as complementary policies to protected areas, payments for ecosystems services or subsidies on forest conservation (Barua, Uusivuori, and Kuuluvainen 2012; Barua et al. 2014; Busch et al. 2012).

A similar case for land taxes applies to urban space. When open space contributes to well-being, taxing land development becomes welfare-increasing (Bento, Franco, and Kaffine 2011). Likewise, replacing property taxes which discourage investments in higher density by land value taxes may also help to reduce urban sprawl, as empirical evidence from the US suggests (Banzhaf and Lavery 2010). (Plassmann and Tideman 2000) emphasized that land taxes may actually increase investments in buildings. A rather large literature explores the extent to which property taxes affect investments on urban land. (Song and Zenou 2006), for example, derived from US-wide panel regressions that urbanized areas with higher property taxes consume less total space. Hence, the empirical evidence suggests a tendency of land taxes and, to a lesser extent, property taxes to put land to its most efficient use.

Contrary to the context of urban sprawl, empirical research on the land-conserving and investment-increasing effects of land taxes for agricultural land is not available. While drawing a parallel with the urban context suggests that land taxes may also limit extensification and increase intensification, the precise environmental effectiveness of this policy still needs to be explored.

2.4. Distributional effects

While most research on land and property taxes focuses on their allocative effects, distributional effects are rarely investigated (Norregaard 2013). This is surprising as distributional effects are important for understanding welfare implications but also for their political feasibility.

One effect which has been described in the literature is the intergenerational effect (Koethenbuerger and Poutvaara 2009). When households save for their retirement by buying land with the intention of using the land rent as a means of living, then land would be predominantly owned by those households that are near or in retirement at the time of the introduction of the tax. They would lose a substantial amount of their savings due to the reduced net land rents. At the same time, they would not benefit directly from a potential reduction in labor income taxes.

A second effect concerns vertical equity, that is, the distributive effect among households with different levels of wealth. If land ownership increases proportionally or more than proportionally with wealth, then a land tax would be progressive. According to (Stiglitz 2015), rents are generally highly concentrated among the rich. In this case, rent taxation would have a progressive effect. However, according to (Bucks, Kennickell, and Moore 2006), land ownership in the US increases in absolute terms in wealth, but decreases in relative terms. While the potential regressivity is an important point to consider, better data would be required as (Bucks, Kennickell, and Moore 2006) for example do not have data on land owned by businesses. The in-depth analysis of specific case study countries in this article will contribute to these gaps.[5]

A third effect concerns horizontal equity, that is, the distributive effect among households with equal levels of wealth. When two households with the same amount of wealth own different amounts of land, a land tax would require them to pay different amounts of taxes in spite of their equal ability to pay. Considering the special case of switching from taxing properties to taxing only land value, Plummer (2010) identifies horizontal equity as an important potential concern.

Governments commonly understand very well that every tax reform creates winners and losers. To avoid drastic changes, a land tax can be designed according to local circumstances. For example, in places with dynamic land values, i.e. near urban areas where rapid development is taking place, unit taxes may in the long-run undervalue location values and raise equity concerns (Rao 2008). Some countries have property taxes and thus, the implementation of a land tax should be ideally done in combination with a tax shift – i.e. gradually introduced through a split tax rate, where there is a simultaneous decrease of rates for structures and increase of land value rates (Oates and Schwab 2009b). Finally, careful management of the timing of property tax reform (assessment ratio or rates) and appraisals procedures can prevent a simultaneous increase in the different factors affecting the tax bill (Bourassa 2009).

2.5. Practical requirements and feasibility constraints for land taxation

After emphasizing the impacts on welfare, we now turn to the transaction costs and implementation aspects of land taxation.

2.5.1. Pre-condition: Land registry and cadaster

Any kind of land or property taxes require a system of land registration, or cadaster, which includes fiscal, social, economic, legal and environmental information on land and its owner. [6] The costs of

[5] Equity effects can arise in a very concentrated form. Consider an investor buying a piece of land for a business project. If a land tax is introduced after the purchase the investor effectively pays twice for the same land, once when buying it and a second time in the form of taxes. In the light of this possibility, several aspects need to be considered for a comprehensive assessment of the equity effect. First, while the investor has additional cost through the tax reform he will likely also have benefits, for example in the form of lower taxes on other inputs or in the form of better infrastructure. Second, any tax reform generates additional costs for some people. A tax reform including land taxes is not unique in this respect. Third, if the business project was profitable before it will also be profitable after the tax reform. The social cost of a potential bankruptcy would thus be balanced by an opportunity for a new investor. And finally, a well-designed tax reform will seek to be balanced in terms of equity. A disproportionate burden of a land lax on some households is a legitimate reason to set lower tax rates than would be optimal from a point of view of efficiency.

[6] It is worth mentioning that land might formally be owned by the government (e.g. as it is the case in Ethiopia or Vietnam). In such cases, users of land may have to pay a fee to the government which then is effectively a tax on land. If farmers or dwellers can use the land for free according to local or national allocation principles, the introduction of a usage fee is conceptually equivalent to a land tax. Hence, the case of governmental ownership of land might not fundamentally alter the analysis on the

introducing land registration can in some cases be considerable (Deininger and Feder 2009). The fact that a large number of low income countries have property taxes (see Table 2.2 in (Richard Miller Bird and Slack 2004)) implies that the costs for establishing cadastral requirements for land taxation are not prohibitive.

Establishing formal and transparent land rights through a land registry has, however, a number of co-benefits that are worth mentioning. There is growing empirical evidence that secure land rights increase agricultural investments as well as sustainable land use practices (Abdulai, Owusu, and Goetz 2011; Abdulai and Goetz 2014; Lawry et al. 2016). Further benefits include improved land access for women (Ali, Deininger, and Goldstein 2014), with improved educational outcomes for children (Matz and Narciso 2010), and reduced deforestation (Robinson, Holland, and Naughton-Treves 2014; Etongo et al. 2015). Because of the various benefits, establishing tenure rights has become an objective of governments and international organizations (FAO 2012), independent from its instrumental role for tapping an additional source of government revenue.

2.5.2. Administrative costs of land taxes

Setting up a land registry, assessing property and land values and enforcing tax payments requires administrative staff and equipment. When administrative costs are high, the efficiency advantages of land taxes might be reversed. The case of prohibitive administrative costs is often made for developing countries: Khan (2001), for example, argues that land value taxation "poses serious administrative problems since the cadastral information about location, area, quality, market or rental value, and ownership must be determined before the tax can be assessed and collected". Similarly, Bird (2011) writes that land taxes are "surprisingly costly", since the land value needs to be determined and payment needs to be enforced.

There are no comprehensive assessments on the administrative costs of land taxes but we review in the following the available evidence, which suggests that costs are not necessarily prohibitive. We can distinguish between fixed costs like setting up a land registry or cadaster and recurrent costs like maintaining and updating a cadaster, valuing property etc.

With respect to **set-up costs**, a closer look at World Bank projects for creating land registries reveals a rough indication of the scale of these costs: For various countries, these range typically between 10 and 100 mln USD (see Table 7 in the Appendix). A project for the creation of a land registry in Ghana, for example, was about 55 mln USD (approx. 0.1 percent of GDP) and in Laos about 28 mln USD (approx. 1 percent of GDP)[7]. A World Bank project on the long-term development of Indonesia's institutional capacity for land administration had an up-front cost of 140 mln USD (approx. 0.1 percent of GDP) which are less than 3 percent of the total annual land rent flows we estimated in Section 4. These numbers suggest that set-up costs are relevant but by far not decisive as they occur only once and constitute a vanishing share of national GDP.

Administrative costs of land rent taxation refer typically to **recurrent costs** which are defined by the costs of assessing land value and collecting taxes, and which are dominated by costs of assessors and employees in the tax administration. Only a few studies exist that quantify these costs: In the case of Croatia, administrative costs as a percentage of property tax raised varied enormously, between 5-50 percent (Blažić, Stašić, and Drezgić 2014). Higher costs are usually paid by smaller municipalities that can rely less on economies of scale in assessing property value (Blažić, Stašić, and Drezgić 2014). A comprehensive study on property taxes in Latin American municipalities by (De Cesare 2010) revealed substantially lower costs of one to 20 percent of taxes raised, with 6 percent costs for a median municipality. The large variability of administrative costs suggests that there is substantial potential for

effects of land taxation as long as the economic decisions on land use (and the financial revenues from using land) are associated to individuals.

[7] The cost as share of GDP refer to the years when the project was closed.

decreasing administrative costs. As tax rates are often below one percent of the property value, applying higher tax *rates* can further reduce the cost-to-collection ratio as revenues are increased but costs are hardly affected.

Total administrative costs of land taxes need to be compared with the administrative costs plus the marginal costs of public funds of other taxes. The administrative costs of the entire tax system of industrialized countries ranges between 0.5 and 2 percent, of Latin American countries around two percent and of African countries between 1-3 percent (Auriol and Warlters 2012). Hence, with respect to administrative costs, land taxes tend to be slightly more expensive, but not excessively expensive. As administrative costs are one order of magnitude lower than the welfare costs due to distortions by labor and capital taxes (Auriol), administrative costs are more than compensated by efficiency gains.

There are various ways to reduce administrative costs by optimizing land value appraisal cycles: while short cycles are costly, cycles that are too infrequent lead to outdated cadaster values which reduce tax revenues when property values increase strongly. In practice, appraisal cycles range between every year to very long periods (e.g. once there is a market transaction) with most appraisal cycles in the US occurring every 4-6 years (Oregon Department of Revenue 2012) and less frequent ones in many European countries (Fernandez Milan, Kapfer, and Creutzig 2016). While administrative costs may be particularly prohibitive where land values are low and/or land plots are small, computational (hybrid) methods and especially geospatial regression models have the potential to reduce costs of mass appraisal (McCluskey and Anand 1999; McCluskey et al. 2013). In this context, technology could make a difference. Brazil for example introduced the "Rural Environmental Registry", which obliged landowners to register their land electronically (Nepstad et al. 2014; Duchelle et al. 2014; L'Roe et al. 2016). While the exact implementation will have to be adjusted to country specific characteristics, the basic idea could become a role model: administrative costs are reduced by actively involving landowners. Landowners are rewarded for their cooperation with services provided by the government, among others, in the form of formal land rights.

In developed countries, land value taxation has been found to be a demanding, but feasible form of taxation. It is demanding since the total value of a property that can be assessed in market transactions is composed of the land value and the value of improvements, in particular buildings located on the land. Sophisticated techniques allow for estimating both components with satisfactory accuracy (Bell, Bowman, and German 2009). In the United Kingdom, the Valuation Office Agency (VOA) is successful in determining land value, see Chapter 16 of (Mirrlees and Adam 2011). In Germany, for example, land value maps are created and updated by expert groups. Even if land value is assessed with error, it is still less distorting than a property tax (Chapman, Johnston, and Tyrrell 2009). Developing countries might thus tap into the knowledge and experience available in developed countries.

Another way of reducing administrative costs is to use unit taxes which might also be locally differentiated to account for different land values. As it is not necessary to assess the value of every plot of land, administrative costs and cadastral requirements are low and, thus, favorable for developing countries (Khan 2001). Several developing countries—including Bangladesh, Ethiopia and Malaysia—use unit taxes and others move towards a land value tax, by adjusting the unit tax by the availability of irrigation and quality of soils (Khan 2001). Other examples that are discussed in more detail below include Vietnam and Rwanda.

2.5.3. Compliance

An important reason that real world tax systems differ significantly from the tax systems considered „optimal" by theoretical economists, in particular in developing countries, is tax evasion and non-compliance (Gordon and Li 2009). Since tax evasion depends on how well a tax base can be observed, observable tax bases should be taxed even if this would not be optimal otherwise. This argument is used by Boadway et al. (1994) and Richter and Boadway (2005) to explain the existence of commodity

taxation in practice. Liu (2013) considers gasoline taxes an attractive source of revenue since gasoline consumption is easy to observe. Likewise, tariffs can be superior to VAT due to tax evasion (Emran and Stiglitz 2005). In this line of argumentation, taxes on property and land are difficult to evade since the tax base is highly visible, immovable and can be easily verified by property assessors (Kenny and Winer 2006; Johnson et al. 2014).

There is neither evidence nor agreement on whether land or property taxes are in general more prone to tax evasion, non-compliance or corruption than other taxes. A major problem of property taxes in developing countries is, however, compliance and incomplete coverage in the cadaster. For Latin American municipalities, for example, 87 percent of existing properties are recorded in the cadaster on average but coverage varies strongly between municipalities (De Cesare 2010). Typically, small plots, land of little value, and agricultural land are not recorded in the cadaster (Kelly 2000). As the value of such land is low, revenue losses due to imperfect coverage might be lower than the actual coverage gap. A more severe problem than coverage of the land registry is, however, the ability of the tax administration to enforce tax payments. 25 percent of the municipalities considered in (De Cesare 2010) collected more than 80 percent of the assessed tax while on average only two-thirds of the assessed tax amount was collected. For African countries, enforcement rates tend to be lower while for Indonesia, 65 to 79 percent of the assessed tax is actually collected (Kelly 2000). While these compliance ratios seem to be low, they are not necessarily worse than those of alternative taxes as non-compliance is not only an issue for land or property taxes: a striking example of poor tax compliance is the VAT in Uganda where only 50 percent of the potential revenues are collected (Hutton, Thackray, and Wingender 2014). Tariffs are also subject to substantial evasion for developing, emerging and developed countries alike (Levin and Widell 2014; Fisman and Wei 2004; Mishra, Subramanian, and Topalova 2008; Javorcik and Narciso 2008).

While corruption tends to be a minor reason for low collection rates, taxpayer morale and missing incentives and fines are considered the major cause for non-compliance (De Cesare 2010; Kelly 2000). Tax compliance depends in general on crucial design aspects like taxpayer segmentation and use of third-party information, but also consideration of behavioral aspects of taxpayers that are related to social norms, intrinsic motivation, perceived fairness etc. (IMF 2015). Manaf et al. (2005) find that compliance of land taxes in Malaysia depends on the perception of the fairness of the tax. (Del Carpio 2013) analyzes within a field experiment in Peru several ways of nudging landowners to pay their property taxes. The importance of the quality of the administration is therefore key and the literature has identified various ways and lessons learned on how to increase compliance (Kelly 1993; Kelly 2000; Richard Miller Bird and Slack 2004; Bahl, Martinez-Vazquez, and Youngman 2008; Bandyopadhyay 2014).

2.5.4. Acceptance and political feasibility

One popular reason as to why land taxation is difficult to implement is the "strong and vocal opposition" they face, in particular by "the rural elite" (Khan 2001). This is easily understandable as an expression of Olson's asymmetry (Olson 1965): if land ownership is concentrated, landowners have a strong incentive to lobby against land taxes. This might make it more difficult to implement such taxes, compared to e.g. taxes on consumption, which result in a more distributed incidence.

However, if land is more evenly distributed, land taxes might be subject to opposition. High volatility in agricultural revenues adds an additional difficulty for farmers to comply. Fixed annual payments can arguably decrease rural livelihood security, and even lead to revolts (Scott 1977). Availability of appropriate insurance tools like rainfall indices can be one way of easing temporal liquidity constraints and reducing revenue risk (Karlan et al. 2014).

The literature has also identified enabling conditions for land taxation in developing countries. As with every tax, land taxes obviously and directly reduce household incomes. A primary approach for increasing

acceptance is therefore emphasizing the direct and indirect benefits through the revenues collected. The provision of co-benefits, like formal land rights, can increase support (Booth 2014). Local acceptance for the tax seems to be decisive as well – it can be increased due to higher transparency on the use of the tax revenues. According to Skinner (1991) the tax is more likely to be supported if it is collected by local governments so that it is easier to track how its revenues are used. In addition, Booth (2014) finds that "if the revenues were not just kept by local governments, but used for specific projects which would be of direct benefit to rural people", acceptance can be increased further.

Redirecting local revenues from land taxation for local investments is closely related to the idea of fiscal decentralization.[8] Kelly (2000) argues that central governments might be reluctant to empower local governments through fiscal decentralization and property tax reform. Other political constraints might relate to investments in land and protection of investors profit margins (see Box 1 below).

[8] So far, however, only weak evidence exists that fiscal decentralization is generally conducive for growth, service provision or poverty reduction (Ahmad and Brosio 2009): Akai and Sakata (2002) identify a positive effect of fiscal decentralization on economic growth which is in contrast to previous findings that relied on poor data (Zhang and Zou 1998; Davoodi and Zou 1998). The data in Akai and Sakata (2002) included a time frame which includes not only periods of rapid growth. In addition, the data uses a culturally homogeneous region (the United States) in order to remove spurious results due to cultural differences. Thornton (2007) by contrast points out that these and other preceding empirical studies are flawed since they don't distinguish between "administrative" and "substantive" decentralization. Correcting for this, he finds that "the impact of fiscal decentralization on economic growth is not statistically significant". Martinez-Vazquez and McNab (2003) argue that by the time of the publication of their paper, neither the empirical nor theoretical understanding of fiscal decentralization was reliable enough to support policy advice. The inconclusiveness seems to continue to this date: Gemmell et al. (2013) find that spending decentralization "is associated" with lower growth and the opposite is true for revenue decentralization. Baskaran and Feld (2013), by contrast, find that fiscal decentralization is actually unrelated to economic growth.

Box 1: Land taxes and (foreign) investments into land

Recent years have, perhaps as part of a strategy to adjust to increased global food demand, witnessed growing acquisition of agricultural land by foreign companies (Deininger and Byerlee 2011). Almost half of these land-deals, which are frequently labelled "land-grabbing", have taken place in Africa, followed by Southeast Asia (especially Indonesia and the Philippines) (Rulli, Saviori, and D'Odorico 2013). A number of negative consequence of foreign land ownership in terms of human rights and environmental impacts have been documented in recent studies (UNECA 2016). Yet, it has also been argued that activist rhetoric of illegality, large-scale acquisitions, and the displacement of local people focuses on a few isolated instances and fails to take into account the broad spectrum of land deals (Hall 2011).

For levying land taxes, it should in principle not make a difference whether domestic or foreign owners hold agricultural land. For instance, taxes on profits or value added are commonly imposed on companies regardless of their country of origin. It can be argued that foreign companies may be able to use the land more efficiently – e.g. due to better access to capital and technology, economies of scale, or integration of supply chains. In this case, these companies would derive a higher value from using agricultural land – and hence would offer a better prospect of taxation. However, foreign investment might be protected by "certain standards of treatment that can be enforced via binding investor-to-state dispute settlement outside the domestic juridical system", aiming to reduce investors' risks by restricting the recipient country's sovereignty (Neumayer and Spess 2005). Provisions requiring states to provide "fair and equitable treatment" are frequently interpreted as protecting investors' "legitimate expectations" with regard to policy change (Cotula and Berger 2015). This is likely to be particularly salient if the investor has paid a sales price that can be regarded as "fair" by reflecting the (discounted) flow of future land rents. As his revenues still exceed the marginal costs of doing business, an investor will continue to operate. However, as long as the revenues are not used in a compensatory fashion (e.g. by improving infrastructure of lowering other taxes; see also the discussion in Section 2.4) he has lost out on the initial investment, which does not reflect the revenues received after the land tax reform. In addition, the prospect of this kind of surprise policy change could scare off potential future investors.

The above considerations might restrict a government's ability or willingness to introduce (or raise already existing) land taxes. Currently, almost two-thirds of land deals were subject to some form of investment treatment, but there is considerable variation of coverage across countries, ranging from 0 percent in Brazil to 100 percent in Vietnam (Cotula and Berger 2015). Ensuring that land taxation is compatible with these deals will be an essential prerequisite for countries aiming to embark on fiscal reform.

2.6. Major experiences with land taxes in low-income countries

More than 30 countries, including developing countries, use or have used some sort of land tax (Dye and England 2010; Richard Miller Bird and Slack 2004; William J McCluskey and Franzsen 2005; Fernandez Milan, Kapfer, and Creutzig 2016). However, countries define the tax differently, i.e. how the tax base is defined, to whom it may apply or how the appraisal is undertaken. For example, land taxes may apply to all land uses, agricultural land or developed land, and exclude other types of land use (i.e. public land). Figure 4 illustrates the land value taxation experiences including the definition of the tax base and the assessment method for various countries.

Land taxes proliferated in young, developing colonies (or ex-colonies) from middle and low income countries as capital improved value systems were perceived to penalize development (McCluskey and Franzsen 2005). They have also been attractive in places where a system of registration of title or deeds was already in place at the time, at least within the areas where property taxes were introduced (i.e. Fiji, Kenya, and South Africa), and where there is no major issue regarding tenure insecurity and boundary disputes. For example, local governments in South Africa have relied upon taxation of urban land values as a significant revenue source for almost a century until early the 2000s, when a law eliminated the local option of a split-rate tax in favor of a single-rate property tax (Andelson 2001).

Although there is no unique approach among world regions on how governments appraise land values, agricultural land is typically assessed using an area-based approach (Khan 2001). When the tax applies to all land uses, including developed land, market or cadastral values are preferred. Governments tend to implement relief mechanisms to ensure that farmers are not taxed too heavily. They use deferrals of non-agriculture related values (New Zealand), differential and preferential rates (Australia, Fiji and South Africa respectively), limiting taxable values to current use (Australia), rebates (Jamaica), or simply exclude

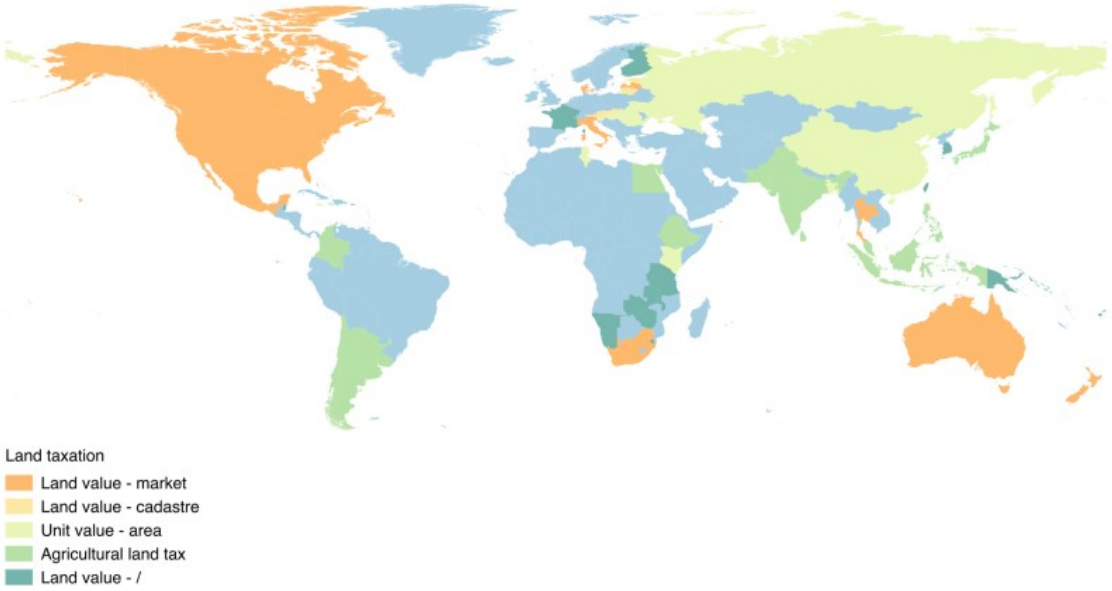
rural land (Kenya and Fiji). In places where development is coupled with rapid urbanization, governments tend to shift towards property taxes to avoid land value appraisal processes (Jamaica, Kenya). In Fiji, however, local authorities have focused on enhancing the assessment process instead of changing the tax base (William J McCluskey and Franzsen 2005).

There is a trend towards implementing differential taxation according to land values and land uses[9] (South Africa, Fiji, Kenya, among others), penalizing unimproved land in particular to curb land speculation (i.e. Hungary, Tunisia). Tax rates in middle and high income countries are typically adjusted annually to avoid the gradual erosion of the tax base (as has happened in the case of Jamaica) (William J McCluskey and Franzsen 2005). Classified assessment systems are another common and cost-effective way of differentiating among property classes (i.e. the Philippines). Under this system, a uniform tax rate is applied and properties are differentiated through assessment value ratios (the percentage of assessed value that is accepted as tax base) (Richard Miller Bird and Slack 2004; Fernandez Milan, Kapfer, and Creutzig 2016).

Land as well as property taxes are often important sources of local revenue, and thus have historically been locally governed (with a few exceptions like Ethiopia, Jamaica and Chile, where national governments regulate and administrate the tax). Their contribution to local revenues is highest in high-income countries, followed by Latin America, and some African countries, and lowest in Asian countries (Richard Miller Bird and Slack 2004). However, there is little evidence on the specific role of pure land taxes – in contrast to property taxes – for middle and low-income countries. Revenues are typically reported together with other local taxes in place (Richard Miller Bird and Slack 2004). In Europe, revenue raised exclusively from land taxes is highest in Denmark, Slovenia and Estonia with around 1 percent of GDP and 2.5 percent of total tax revenues (Fernandez Milan, Kapfer, and Creutzig 2016). Overall, the experience with land taxes is very broad (see Fig. 4) and interaction effects have to be discussed at the national level.

[9] Commercial and industrial owners typically do not vote in that jurisdiction and governments feel free to impose higher tax rates on them (William J McCluskey and Franzsen 2005; Dye and England 2010).

Figure 4 Land taxation experience



Note: based on (Dye and England 2010; Richard Miller Bird and Slack 2004; William J McCluskey and Franzsen 2005; Fernandez Milan, Kapfer, and Creutzig 2016; Khan 2001). Countries have only a land-based tax ("Land"); others have a complementary property tax ("property tax"), or there is no available information whether additional taxes on property exist ("land; -"). For country-based information see Table 6 in the Appendix).

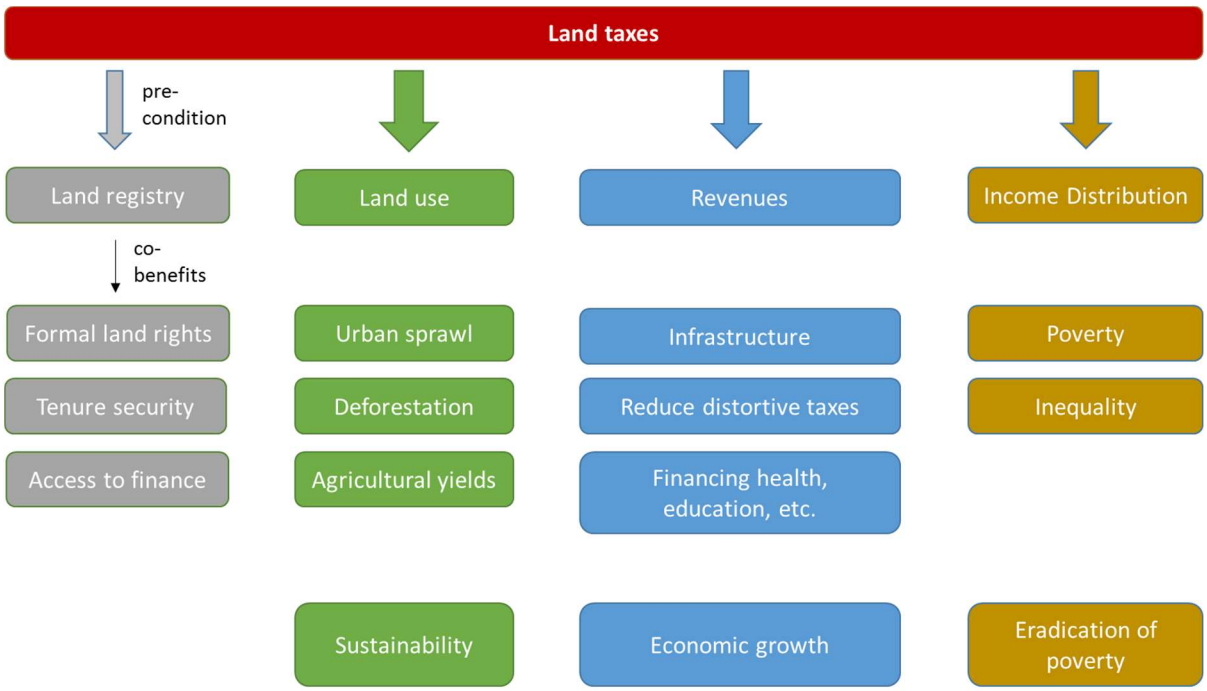
2.7. Synthesis: How land taxes can contribute to sustainable development

The previous elaborations on the various effects of land taxes on economic growth, land use and inequality are summarized in Figure 5. Various co-benefits of formal land tenure with a centralized land registry are related to sustainable land use and deforestation, rural development as well as social inclusion (Section 2.5.1). Land taxes, if differentiated among land type, can directly affect incentives for land use and help put land to its most productive use (Section 2.3). Taxes designed to absorb part of the land rent are a non-distorting way of financing government expenditures. As a result, other taxes that impede growth or have adverse environmental or food production effects, such as agricultural taxes, can be reduced (see Malan 2015 for Africa). Alternatively, investments in infrastructure, health or social security can be increased – domains where additional investments have large social returns for developing countries and facilitate the achievements of the SDGs. Increased infrastructure contributes to growth (Esfahani and Ramírez 2003; Mattauch et al. 2013) but may also induce further intensification as well as extensification. Using higher revenues for infrastructure investments can contribute to more productive land-use (Craig, Pardey, and Roseboom 1997; Pinstrup-Andersen and Shimokawa 2006; Headey, Alauddin, and Rao 2010). An empirical analysis by Neumann et al. (2010) on global yield gaps found that limited access to markets and irrigation explains a large share of the yield gap in developing countries. In contrast, a spatial data analysis in Brazil emphasizes the role of infrastructure and access to remote areas in increased deforestation (Pfaff 1999). Finally, land taxes directly reduce household incomes and indirectly affect incomes in the way that revenues are recycled through the fiscal system or other tax reductions.

While the case for efficient revenue raising is strong and supported by the literature, weaker evidence exists on the potential to change land use dynamics. Existing model calculations by equilibrium models on land tax shifts confirm that land taxation increases efficiency (decreases MCF); models with endogenous land supply also indicate land-sparing effects while distributional effects are often very

heterogeneous (see Table 7 in the Appendix for details). The impact on inequality is a priori unclear and has hardly been analyzed thus far.

Figure 5. Land taxes and sustainable development – synthesis



Source. Own elaboration based previous subsections.

3. Country Typology

We develop a simple typology to identify countries that perform well among some of the key aspects of sustainable development outlined in Section 2.7 and where institutional requirements for land tax reforms are supportive. We group out indicators into aspects of land taxation that (i) tend to increase social welfare ('benefits') and (ii) are related to the feasibility of land taxation. As we rely on cross-country data for 83 middle and low-income countries where all world regions are represented, only a limited set of indicators is considered. A detailed and technical description of the indicators and data sources is given in Appendix Section 7.4.

3.1. Data on typology indicators

Here we outline the major characteristics of indicators and sources. With respect to environment-related indicators, we use (1) *deforestation rates*[10] as one indication of the environmental effects of reduced land demand in a country and (2) *cereal yields* as an indication of the level of land use efficiency.[11] Both indicators are readily accessible and provide a rough indication of extensification pressure and intensification potential, respectively. Within the economic dimension of land taxes, we cover the revenue raising potential of land taxes, the need for additional public funds and the distortions of the existing fiscal system: we use (3) *agricultural land rents* (as a percentage of GDP) (World Bank 2011b) as

[10] Deforestation rate refers to % change of forest area between 2005 and 2015, using data from FAO (2016a)

[11] cereal yields are calculated in kcal/ha, based on data from FAOSTAT

an indicator for the maximum amount of revenues that can be obtained by (agricultural) land rent taxation.[12] In countries with low land rents, the introduction of land rents will consequently generate low revenues. We consider (4) *financial needs* for development-related infrastructure investments.[13] High financial needs indicate large social returns of public investments which need to be compared with the efficiency and administration costs of the fiscal system to raise revenues. We proxy the efficiency of the fiscal system by looking at (5) *taxes on trade*[14] that are usually more distortionary than taxes on consumption and land (see section 2.2).[15] Finally, a land tax also affects wealth and income distribution and therefore poverty levels. If land taxes are primarily paid by the rural poor, this may increase poverty and inequality. As a proxy for the land tax burden on the poor, we consider (6) the *shares of small sized agricultural holdings* with area size less than 2 hectares (FAO 2014). If most of the agricultural holdings are small, a land tax will apply predominantly to subsistence farmers who typically have very low incomes.

The welfare-related indicators are complemented by two feasibility indicators which address institutional barriers for implementing a land tax reform: (a) the *quality of land administration index*[16] and (b) the *control of corruption index*.[17] Land tax reforms should be easier to implement in countries with high quality of land administration services. Compliance and revenues created are also higher for countries with high quality of land administration and low levels of corruption.

3.2. Selection of Pareto frontier countries

We group the mentioned indicators into a "benefit" category (for the six indicators related to direct effects of land taxes on social welfare) and a "feasibility" category. For selecting case study countries, we are interested in cases with high potential and high feasibility, as these would be countries where land tax reforms will have a high chance success. Because our feasibility indicators (and also some benefit indicators) are non-monetary, there is no clear way of aggregating them. Rather, we plot countries in the benefit-feasibility space (varying by indicator) and choose the Pareto-frontier of countries.[18] Hence, a country lies in the Pareto frontier if there is no other country with higher benefits and feasibility.

Clearly, a country at the Pareto frontier provides a more interesting case for deeper analysis than a country behind the frontier. Nevertheless, the identification of the Pareto frontier is also subject to measurement error and imperfections in the underlying data. To relax the strict Pareto criterion, we include additional (higher-order) Pareto frontiers, i.e. the subsequent Pareto frontiers that lie behind the first frontier.[19] Considering the first three Pareto frontiers allows for a selection procedure for case study

[12] We use agricultural rents as data on urban land rents are not available.

[13] Financial needs are expressed as required infrastructure costs (% GDP) that would enable universal access to five types of infrastructure which are also considered in the Sustainable Development Goals: water, sanitation, electricity, roads, and information and communication technology (ICT) (Jakob et al. 2016).

[14] These are calculated as the sum of customs and other import duties and taxes on exports (expressed as % of GDP).

[15] Ideally, we would use MCFs as indicators for the efficiency of the tax system. There is no comprehensive and consistent dataset on MCFs estimates. Taxes on capital and labor might also serve as indicator for the efficiency of the tax system but data is available only for a limited number of countries.

[16] The land administration index is the sum of the scores on four sub-indices: reliability of infrastructure, transparency of information, geographic coverage and land dispute resolution indices. We normalized the index to values between 0 and 1, with higher values indicating better quality of the land administration system. (World Bank Group 2016)

[17] The control of corruption index is part of the Worldwide Governance Indicators (WGI) project (World Bank 2016b); it reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests (Kauffmann and Kraay 2016).

[18] Formally, the Pareto frontier is defined by $i \in P^1 \leftrightarrow$ for all $j \in N, j \neq i$: $b_j > b_i$ and $f_j > f_i$ with i,j indicating countries (total N), and b_j benefits and f_j feasibility of the respective country.

[19] Formally, we call P^1 also the first-order Pareto frontier and we define the m-order Pareto frontier recursively as the Pareto frontier of the set of countries without the m-1, m-2, … 1 order Pareto frontier: $i \in P^m \leftrightarrow$ for all $j \in N \backslash (P^1 \cup P^2 \cup \ldots \cup P^{m-1}), j \neq i$: $b_j > b_i$ and $f_j > f_i$

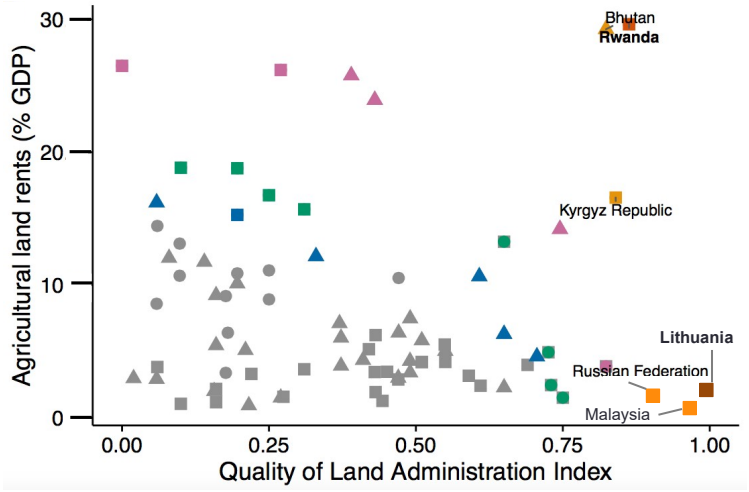
candidates which is more robust and less prone to measurement errors. The typology thus allows for the identification of 'low hanging fruits', i.e. countries where land taxation is likely to have high benefits and apparently feasible institutional conditions for the reform to be successful.

3.3. Results of the typology

As an example, Figure 6 shows the Pareto frontiers results for the quality of land administration index and agricultural land rents. Appendix 7.5 contains the remaining results, with Figure 9 including all other Pareto frontiers and Table 10 listing the countries according to =world regions and the numbers of Pareto frontiers in descending order.

The countries that emerge as the most promising candidates for land taxation are located in different world regions and income groups, which suggests that land rent taxation might be of interest for a broad array of countries. In Sub-Saharan Africa, the spending dimension is of particular relevance, followed by the potential to reduce distortive taxes and enhance yield production. Latin American countries show higher potential with regard to the environmental dimension (yield productivity and deforestation). Countries from Southeast Asia and the Pacific show no preferential dimension, performing well across all indicators. Lower middle-income countries seem to perform particularly well with respect to the share of small farm holders.[20]

Figure 6. Typology results - Pareto frontiers for the indicators Quality of Land Administration Index and Agricultural Land Rents.



4. Case studies

4.1. Country selection and characteristics

We focus on six countries for a more detailed analysis, two from each of the following regions: Sub-Saharan Africa, Southeast Asia and the Pacific, Latin America & Caribbean. Our selection criteria are based on a combination of factors: the representation of different world regions, their performance in

[20] A deeper analysis of reasons for countries' location in the typology is beyond the scope of this paper, as we use the typology only as a means of identifying and highlighting countries with specific characteristics.

the typology, the availability of up to date household data, and the motivation to select non-neighboring countries within each region in an attempt to be as representative as possible.[21] We review the existing tax system with respect to land and property taxes and explore the potential for enhanced land rent taxation including its distributional effects. For quantifying revenue and distributional effects, we also include quantitative micro-simulations based on nationally representative household data.

We select Rwanda, Ghana, Indonesia, Vietnam, Nicaragua, and Peru, which allows us to capture a large variety of countries with differing welfare and feasibility aspects. Table 2 summarizes their main characteristics related to our typology. Rwanda is a country with relatively good institutions (in the African continent) with respect to land administration and control of corruption, high agricultural rents and high financial needs. Ghana, the second African country in our country selection, has lower agricultural rents and worse institutional performance than Rwanda. Implementing land taxes might be more challenging in Ghana but they could be particularly beneficial if combined with reduced trade distortions: as the nominal rate of assistance is negative, agriculture is effectively taxed and production is thus discouraged. Both African countries are characterized by high population growth rates (above 2 percent – compared to growth rates around 1.2 percent for the other countries). Hence, demand for housing but also for land for food production is expected to increase in all six countries with substantial increases in Rwanda and Ghana.

Indonesia is a country that experiences a strong deforestation rate. Thus, high taxes on agricultural land (in particular land for palm oil production) could be a complementary instrument in reducing deforestation. As Indonesia already uses land taxes, institutional feasibility for upscaling land taxes should be rather high, though the land administration is plagued by bureaucratic rules, complex multi-level governance and corruption. Because small farmers operate a large share of the agricultural land holdings, distributional effects are of particular interest. Most farmers in Indonesia are small-scale farmers. Peru has rather high fiscal needs to ensure universal access to essential infrastructure. Agricultural holdings are relatively large, indicating that land taxes would not affect many households under the extreme poverty line. With respect to agricultural land use efficiency, Rwanda, Ghana and Nicaragua have low cereal yields, indicating large land-saving potential. Negative rates of assistance for agricultural products in Ghana and Nicaragua might be one explanation for these low yields as they discourage investments. In contrast, yields in Peru, Indonesia and Vietnam are already high. With respect to inequality characteristics, the Gini index is high in African and Latin American countries; absolute poverty is highest in Rwanda and Ghana while the remaining four countries have poverty rates below 10 percent. Thus, distributional effects of land taxes are particularly relevant for African countries as they might affect poverty rates.

[21] In the case of Sub-Saharan African countries, Uganda would be the next one with data availability on the Pareto frontier. However, due to the similarities it has with Rwanda, which was already selected, we decided not to take a neighboring country.

Table 2. Main characteristics of the six countries selected.

Region	Sub-Saharan Africa		Latin America & Caribbean		South East Asia and Pacific	
Economy	**Rwanda**	**Ghana**	**Peru**	**Nicaragua**	**Indonesia**	**Vietnam**
Income	Low income	Low income	Upper middle	Lower middle	Lower middle	Low income
Population (mill.)	11.34	27.40	30.97	6.02	257.60	91.70
Population growth (annual %)	2.30	2.30	1.30	1.10	1.20	1.10
Urban share (%)	28.81	54.04	78.61	58.78	53.74	33.60
GDP/cap (US$)	690	1697	5934	1849	3834	1685
Agricultural land rents (% of GDP)[22]	29.63	10.88	4.21	11.74	5.10	10.85
Agricultural land rents (% of GDP)[23]	20.00 (est.)	16.38	2.65	3.79	5.34	4.87
Financial needs (% of GDP)[24]	266	56	64	310	44	42
Trade tax revenues (% of GDP)[25]	1.25	3.60	0.30	0.74	0.58	-
Deforestation rate (% of total area)[26]	-1.40	-0.62	0.70	0.00	1.90	-2.10
Quality of land administration[27]	0.86	0.20	0.55	0.14	0.21	0.43
Control of Corruption	0.77	0.45	0.30	0.20	0.35	0.36
Yields (Mcal/ha)[28]	7102	5731	11530	6218	13269	13609
Small agricultural holdings[29]	-	-	0	21	88	95
Poverty rate	60.43	25.19	3.13	6.22	8.25	3.06
Gini Index	44.8	42.77	44.14	47.05	39.47	37.59
Nominal rate of assistance (NRA)[30]	-	-0.04	-	-0.12	0.20	0.11
Land tax potential	1,2,3,4,5	3, 5	1,4	4	1, 6	4,3, 5

Note. For land tax potential according to Pareto frontiers, included until 3rd Pareto frontier. Indices represent the indicators, where 1: deforestation; 2: yields; 3: agricultural land rents; 4: financial needs; 5: tax distortions; 6: share of small farm holders. Data on population, population growth, urban share and GDP per capita are from 2015. GDP/cap refers to constant 2010$. Poverty rates and Gini Index are from most recent year available. Source: (World Bank 2016a). An exception is the Gini coefficient for Rwanda, which is taken from the Rwandan Fourth Population and Housing Census – 2012. World Development Indicators report a Gini coefficient of 50.44.

Table 3 emphasizes the main characteristics of the fiscal systems of those countries where we perform an in-depth quantitative analysis. While Peru enjoys large revenues, particularly from natural resource extraction and mining, the main sources of tax revenues in all countries are income and consumption taxes. The allocative efficiency costs of these distortionary taxes can vary substantially and can exceed 100 percent, as in the case of Rwanda. In contrast, land and property related taxes (including taxes on property transactions) constitute only a minor share of government revenues. Hence, Table 3 indicates

[22] Source: (World Bank 2011b).

[23] Land rent data taken from (H.-L. Lee et al. 2009) and GDP data from (World Bank 2016a). Rwanda is based on data from Uganda, as there was no data available; Nicaragua takes average per hectare land rent for Central America and multiplies it by 2000 Nicaragua´s agricultural land surface (World Bank 2016a).

[24] Source: (Jakob et al. 2016).

[25] Sum of the share of customs and other import duties and taxes on exports as % GDP, using most recent year (between 2010 and 2015). Source: World Bank (2016).

[26] Inverse of delta forest area (% of land area) 2005-2015. Source: FAO (2016a).

[27] Quality of land administration index normalized to 0-1 values. Source: World Bank Group (2015).

[28] Area-weighted average cereal yields in Mcal/ha per country (average for 2010-2014). Source: Kalkuhl and Mujahid (2014).

[29] Agricultural holdings <2ha as % of total agricultural holdings. Source: FAO (2014).

[30] Source: Anderson and Masters (2009).

that shifting the source of government revenues from distortionary taxes to land taxes can have substantial economic benefits by reducing deadweight losses of the existing tax system.

Table 3 Overview on current fiscal system and the role of land and property taxes

	Rwanda	Peru	Nicaragua	Indonesia
Current fiscal system				
Tax revenues (% GDP) - Total	16.04	18.92	20.37	12.17
Income	5.98	7.72	5.77	5.17
VAT	5.18	7.06	6.33	3.87
Trade	1.58	0.18	0.62	0.41
Land & property (recurrent)	0.00	0.22	0.12	0.22
Marginal costs of public funds (MCF)[31]	1.23-2.47[32]	0.60-1.71[33]	NA	0.74-1.91[34]

4.2. Data and methods for household analyses and simulations

The quantitative results presented here are based on the analysis of data from nationally representative household surveys that include information on income, expenditures, land ownership and property ownership (see Appendix Table 13). For calculating the size of land rents, we distinguish agricultural land, housing land (property) and other land (typically business property), depending on availability in the household survey. For agricultural land, we use the rent flow from renting out land that households own as rent value. If households use land that they own, they are typically asked about the value of selling that plot of land (or buying an equivalent plot of land). We calculate the implicit rent flow from cultivating land that households own with a country-specific price-to-rent ratio. For housing property and other property we proceed equivalently. There are often mixed or traditional tenure regimes where households hold land or property without considering themselves to be the (formal) owner. We consider these households generally as (economic) owners of the land rent if they do not pay a rent for using the land or property because they benefit from using the land without paying for it.

Whereas agricultural land has almost all value coming from the pure land rent, the value of housing property depends also on the structures in place. In order to infer the pure land rents of housing properties (to which a pure land tax would apply), we estimate a household-specific land to property ratio. The ratio is based on a regression analysis where we estimate the property rent variation according to two groups of indicators: a) structure-based factors, such as type of construction materials and property size, and b) land-based factors, such as accessibility to basic public infrastructure (transport, water, schools, etc.) and distances to these public facilities and regional dummies (see Annex 7.8 for more details). While the former influence the value of the structure, the latter determine the value of the land without structure. The land to property ratio is then estimated from the predicted land and structure value from the regression.

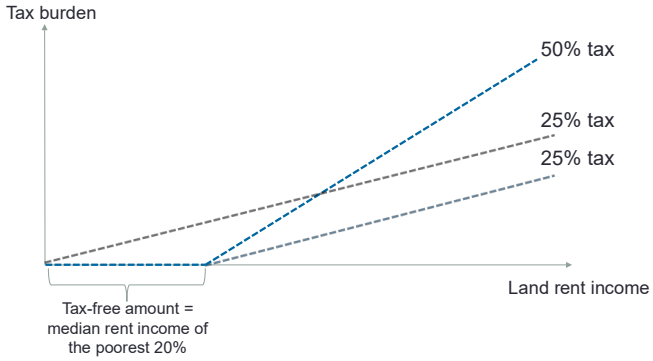
In order to analyze distributional implications of land taxes, we group households into five income quintiles depending on their adult-equivalent per-capita expenditure.[35] We use aggregate expenditure

[31] As MCF are calculated for individual taxes, we show a range over all considered taxes with income taxes typically on the upper range. Negative MCFs indicate welfare gains that can arise if a tax reduces other market imperfections or distortions.
[32] Source: Auriol and Warlters (2012).
[33] Source: Cordano and Balistreri (2010).
[34] Source: Devamjan et al. (2002).
[35] We calculate income on a per-capita base for calculating the income quintiles (as otherwise small HHs would be considered more likely to be in a lower income quintile). For calculating income per capita, we correct for the fact that children cost less

data as they provide a more reliable proxy for the permanent net income of households (Friedman 1957; Slesnick 1993), except for Peru where aggregated income data was available. In the following, we use the term income synonymously with permanent income or expenditure.

Our first aim is to calculate land rents and their distribution among the population (see Table 4 below and Figure 12 and Figure 13 in the Appendix). We first estimate the average land ownership and then the median rent income share of land owning households for different income quintiles. We use the median rent income share, as this is less sensitive to outliers that are particularly driven by households with very low incomes which inflate land income shares. We further upscale households' land rents to the national sum using the survey weights from the sampling design, which gives us an estimate of the national annual land rents for different land uses.

Figure 7 Policy simulations: non-linear tax schemes



The second aim of the quantitative analysis is to estimate the revenues of a land value tax (Table 5) as well as the distributional effects among households relative to their income (Figure 8), assuming that land owners will carry the entire burden of the land tax. We analyze two different designs of land taxes. The first one is a linear tax where all rents are taxed at a constant rate. We choose 25 percent and 50 percent to illustrate revenue and distributional effects. With a price-to-rent ratio of 20, a land rent tax of 20 percent corresponds to a tax on land value of one percent. As property taxes typically range between 0.1 and 2 percent of the property value (see De Cesare (2010) for Latin America), the 25 percent rent tax corresponds to a rather typical property tax rate. As moving from property taxation to land taxation reduces the tax base because the value of structure is not taxed, our 50 percent land rent tax can be considered as a land rent tax that generates revenues similar to those of a typical property tax. Due to the linear nature of the assumed taxation scheme, revenues and distributional effects for different tax rates can be deduced in a straightforward manner by scaling. The second tax design we consider is a non-linear land tax that assumes a "tax-free" amount based on the median total rent of landowners in the poorest quintile (including agriculture and housing for all countries except Peru). Above that tax-free amount, the linear tax applies (see Figure 7). This non-linear tax scheme is considered as it may a) reduce the administrative costs and b) enhance the progressivity of the tax design. The results are shown in Table 4 and Figure 8.[36]

We report land rents (as well as revenues from land taxes) relative to GDP and relative to household income. The nationally up-scaled household data gives substantially lower aggregate household incomes than national GDP numbers (up to 50%). This might be due to various reasons: (i) wealthier households might be under-represented, (ii) consumption or income data might be biased downwards, (iii)

than adults. Based on (Deaton 2003) we consider children (0-14 years) to be equivalent to 0.3 adults in Rwanda, Ghana and Nicaragua and 0.5 adults in Indonesia.

[36] We also consider a "tax-free" amount based on land types (housing and agricultural land when available) and location (urban and rural), based on the hypothesis that the distribution will become more progressive, but this is not the case as agricultural median values are more homogeneous for different quintiles, thus the results are reported only in the Appendix (see Appendix 7.8.4).

expenditure on some items or income has not fully been reported and (iv) income and land ownership from foreigners, large national or multinational companies or from the state are not recorded in the household data. All of these issues would likely imply downward-biased land rents. Measurement errors and underreporting of income, expenditure and assets are a common problem in household surveys (Moore and Welniak 2000). While information from household data is affected by measurement error, it is often the only source of information on land rents *and* on the income distribution. Aggregate estimates for agricultural land rents allow for cross-checks but are also subject to methodological criticism. Hence, the insights from the household data analysis should be understood as an effort to expand the available knowledge and data on land values and their distribution.

4.3. Case study results

4.3.1. Overview on quantitative results

The quantitative household analysis will provide information on the size and distribution of land rents, as well as the revenue and distributional effects of land rent taxation. As Table 4 and Figure 11 (Appendix) indicate, land ownership is widespread and rather homogenous: except for Nicaragua, more than 90% of households in the lowest income group are landowners, mostly as they own the house they live in. In contrast, high-income households tend to be less likely to be landowners: they frequently live in cities in rented apartments and they do not own agricultural land as often, since they do not work as farmers. Hence, land rent taxation will affect a large share of the population and therefore enjoy a broad tax base.

Our decomposition of property value into a land value and a structure value reveals that land values constitute on average 40 to 50 percent of the property value (see Table 15 in Appendix), indicating that roughly half of the property value consists of the land rent. This is consistent with other estimates of land value share on housing values (Knoll, Schularick, and Steger 2017). The subsequent calculations for urban land rents refer therefore to the pure land rent component of property. As expected, agricultural rents are more relevant for the rural population and constitute 2-7% of household income. Median housing rents constitute 3-7% of income and total land rents range from 8-12% of household income (Table 4).

As discussed in the methodology section, rents measured as % of GDP are far lower than those measured as a percentage of household income due to biased or incomplete reporting of expenditure, income and land ownership data. For agricultural rents, we can compare our micro-estimates directly with macro-estimates from other sources, particularly from the World Bank and the SAGE database which are based on revenues and costs from cultivating agricultural land, see Table 2. We find again that agricultural rents calculated from the household data are below the macro-estimates. The figures from the household data provide an independent estimate of land rents. They also emphasize that estimates of land rents – based on one methodology or another – should be treated with some caution.

A particular reporting problem arises for total agricultural land in Indonesia and Rwanda. For the former, the total land households own (17.2 mln ha) is far lower than the total non-forest crop land that Indonesian Agricultural Ministry reports (39.3 mln ha)[37] or the agricultural area (including meadows and pastures but not forests) that FAOSTAT reports (57 mln ha). One source of under-reporting can be that large-scale commercial palm oil plantation owners are not well represented in the household survey. Large-scale commercial palm oil plantations cover almost 4 mln ha of land from which 2 mln ha is owned by foreign companies.[38] If the agricultural area is indeed 57 mln ha and the land value of the non-reported land similar to the land reported in our survey, total agricultural rents may indeed be more

[37] See Secretariat General – Ministry of Agriculture 2014: Statistics of Agricultural Land 2009-2013.

[38] Figures refer to 2011, see http://www.datacon.co.id/Sawit-2011ProfilIndustri.html

than three times the value indicated from the household survey, i.e. 3% of GDP or 7% of household income. A similar discrepancy is visible in Rwanda, where the total land owned by households reported in the household survey (0.9 mln ha) represents only 50 % of the agricultural area from FAOSTAT data (1.8 mln ha). Hence, true land rents will likely be higher than those we estimate with the household data. If the missing land rents accrue to domestic or foreign companies, they might be subject to taxation as households are; in contrast, state-owned land will not provide any additional tax revenues for the government.

With respect to the distribution of land rents, low-income households tend to have larger rent income shares, which can be substantial for the poorest households. These can reach up to 17% of income, as in the case of Rwanda. Hence, land rent taxation might be regressive as it disproportionately affects poor households. Where data is available (Rwanda), we further find that only a minor share of households actually pays property taxes. These revenues constitute a negligible amount of government revenues.

Table 4. Household survey data – analysis of land rents

	Rwanda[39]	Peru[40]	Nicaragua	Indonesia[41]
Agricultural land rents (% GDP)	3.91	-	4.70	0.97
(% Household income)	6.72	-	7.27	2.39
Housing land rents (% GDP)	1.48	0.98	2.78	2.11
(% Household income)	2.54	1.96	4.30	5.19
Total land rent (% GDP)[42]	5.39	-	7.48	3.42
(% Household income)	9.27	-	11.57	8.41
Land ownership (% of HH)				
Poorest quintile	95.31	96.97	75.41	96.46
Middle quintile	93.50	90.34	73.34	93.46
Wealthiest quintile	69.92	87.10	76.24	85.61
Median rent income share of land-owning HHs (%)		(Housing)		
Poorest quintile	16.77	3.64	9.21	9.96
Middle quintile	13.95	2.30	6.28	5.81
Wealthiest quintile	7.82	1.72	5.31	3.44
Median annual land rent in poorest quintile[43]		(Housing)		
Local currency	RWF 42.407	S/ 330	NIO 5,410	IDR 1,606,229
US$ (adjusted to 2014 PPP conversion factor)	160	201	510	350
Property tax revenue (% of GDP) current system	0.12	-	0.05	-
Property tax payers (as a percentage of HH) current system	7.73	-	15.71	-

Source: Own calculations based on household surveys.

With respect to the policy simulations, our analysis reveals that a 25 percent linear tax creates revenues of around 1 percent of GDP. Although these numbers seem to be small, they may constitute a substantial share of the current government revenues. Levying a tax of 50% on land rents would be sufficient to cover more that 14 percent of the current government budget for Rwanda, Indonesia and Nicaragua. For Peru, only data on housing rents are available; applying a tax of 50% on these rents would only amount to about 3% of the government budget and hence would not make a significant contribution to the consolidation of public finance. Figure 8 shows the tax burden for each household as a percentage of total income (only considering households who are landowners). Even though rents are on average higher in wealthier households, housing land ownership and average rents as a percentage of income are higher for lower income households (see also Figures in Appendix 8.8). This means that linear taxation schemes, such as the ones shown for tax rates of 25 percent (blue) and 50 percent (red), have regressive impacts on the distribution of income. For instance, in Rwanda, the 50 percent land rent tax would amount to about 6 percent of available household income for the poorest quintile, but less than 3 percent for the richest.

One approach to avoid regressive outcomes would be a nonlinear system with a "free tax" amount applicable to all households based on the median total land rent of the poorest income quintile (see Table 4). Above that amount, tax rates of 25 percent (green) and 50 percent (orange) are applied on land rents. Figure 8 illustrates that from a purely revenue raising point of view a linear system is most advantageous, while the nonlinear system is preferable for distributional reasons as it shows a mostly progressive incidence. Hence, avoiding regressivity can be achieved by accepting revenues that are

[39] Main figures: Tax revenues (as % GDP) for 2015, source: (World Bank 2016a). Income, VAT, Trade, Land and Property figures from 2009, source: (US AID 2011).

[40] Data only available for housing for all analysis but ownership where agricultural land is also reported.

[41] Main figures source: data for Indonesia for 2005-2008 (average) from Table 1 in Amir et al. (2013).

[42] Indonesia reports also for „other land rents", which include for example, business land, and represent 0.33 and 0.82 % of GDP and of Household income respectively.

[43] Only landowners included (renters excluded). PPP conversion factors for private consumption (LCU per international $), 2014 Source: World Bank (2016a).

between 26 percent and 38 percent lower than they would be under linear taxation (Table 5). Under the non-linear tax scheme, the average effective tax rate falls substantially because of the tax free amount: Even for the 50 percent non-linear tax scheme, effective tax rates range from 30 to 39 percent suggesting a more moderate tax burden. Policymakers thus need to appropriately balance the trade-off between maximizing revenues and ensuring equitable distributional outcomes. Table 5 also shows that under a nonlinear tax, depending on the country, the number of taxpayers would be reduced by between 30 percent and 46 percent, which would decrease administrative costs.

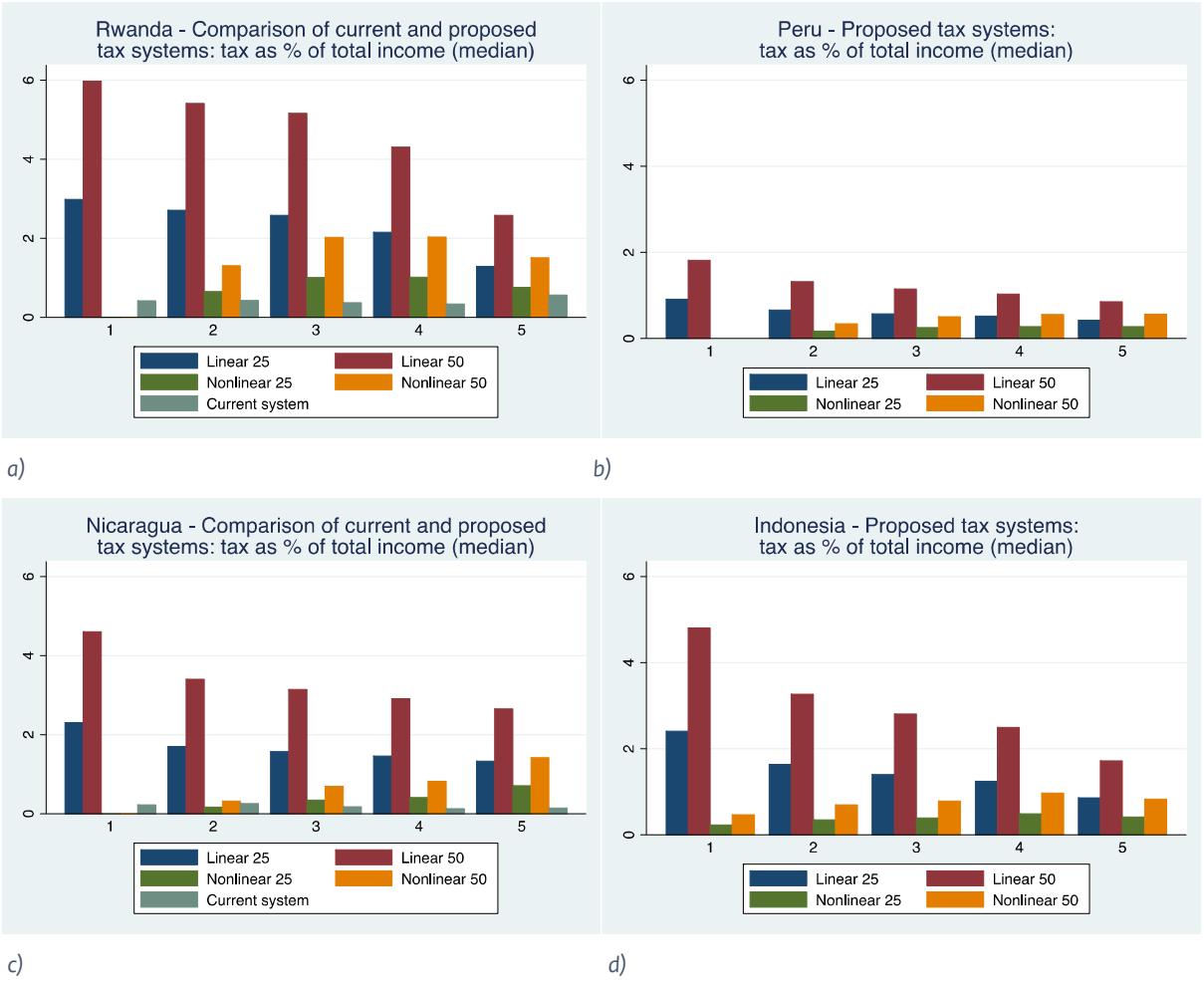
Finally, in Rwanda we can also compare the proposed systems with that currently existing system (green-grey in Figure 8). Property taxes in Rwanda perform worse in both revenue raising and progressivity compared to the proposed tax systems. Interestingly, in Rwanda, both simulated non-linear tax schemes will lead to larger tax liabilities for richer households but not for the poorest ones, in comparison to the current tax regime.

Table 5 Main revenue implications of land taxes

	Rwanda	Peru (housing only)	Nicaragua	Indonesia
A. Linear tax scheme				
N° tax paying households	2,219,040	7,741,249	1,069,663	64,082,198
Tax revenue (% of GDP) at 25% tax rate	1.35	0.25	1.87	0.86
Tax revenue (% of GDP) at 50% tax rate	2.69	0.49	3.74	1.71
Government budget increase (%) at 25% tax rate	8.40	1.30	9.17	7,03
Government budget increase (%) at 50% tax rate	16.76	2.58	18.35	14,06
B. Non-linear tax scheme				
Taxpayers drop out (nonlinear vs. linear) (%)	35.36	30.06	33.43	45,97
Total revenue reduction (nonlinear vs. linear) (%)	27.10	39.79	22.20	28.76
Average tax rate of non-linear 25% tax (%)	18.21	15.08	19.43	17.81
Average tax rate of non-linear 50% tax (%)	36.43	30.23	38.86	35.62

Note: Tax-free amounts are based on the median annual total land rent in poorest quintile (see Table 4). In the Appendix 8.1 further results are shown; outcomes of policy simulations are calculated using tax-free amounts based on land types and location (urban and rural)

Figure 8. Distributional implications of different land tax systems over expenditure quintiles.



Note: Tax paid by each household as a percentage of total income over the income quintiles (x-axis) for a 25 percent and 50 percent tax rate for the linear and the nonlinear system for a) Rwanda b) Peru c) Nicaragua and d) Indonesia (median). Only households owning land are considered. Quintile 1 are the poorest households and quintile 5 the richest ones. Non-linear taxes consider a "tax-free amount" equal to the median land rent of the lowest income quintile – see Table 4. In the case of Rwanda, expenditures on current actual land taxes are also included.

In the following, we review the existing fiscal systems for property and land taxes for the case study countries and discuss relevant reform options, with reference to our quantitative analysis. A detailed overview of key characteristics of the existing tax systems is given in Appendix 0.

4.3.2. Rwanda

Rwanda is a country located within Central and Eastern Africa with a population of approximately 11.3 million people. The country has maintained an average real gross domestic product (GDP) economic growth rate of 8 percent over the period 2010 to 2013 and 7 percent since then, with a stable inflation and exchange rate (PwC, 2015).

Main characteristics of current land tenure and land tax regime

Most Rwandans live in single family houses, where each family owns a plot of land. However, there are new trends, particularly in urban areas, where the urban population tends to live in high-rise condominiums and informal settlements where a person owns a land parcel but several housing units

are built on that parcel on leasehold bases. The real estate market shows increasing dynamics nationwide, with 75,000 real estate transactions in 2014. These transactions represent, however, less than 1 percent of total urban and agricultural properties (Kopanyi 2015).

Land ownership and property taxes are primarily regulated by laws from 2002 and 2005. The government has been working on a new law since 2014 (Rwanda Revenue Authority 2016). All land in Rwanda belongs to the state, the districts and the cities, which then lease out the land to individuals or companies for a period of 99 years (Fortune of Africa 2016; Republic of Rwanda 2016). Following a decentralization approach, the collection and administration of property taxes has been vested in local authorities (Provinces and Districts) (Kopanyi 2015). As of today, there are two property taxes: the Land Lease Fees (LLF) and the Fixed Asset Tax (FAT) (Rwanda Revenue Authority 2016; Kopanyi 2015). The LLF is a land unit tax that varies typically between RWF 70, 30, 5 or zero per square meter with no charge for improvements. The tax includes parcels regardless of whether they are registered or not. In rural areas, the district or town council determines the tax and large land holdings are taxes at higher marginal rates. The FAT is levied only on registered personal properties and includes the value of land, building, and improvement and is charged with a tax rate of 0.1 percent of market value. Differential taxation may apply according to the location, type and use of building according to local regulations. There is also a capital gains tax, in which the gains of selling immovable commercial property are taxed at 30 percent (PwC 2015). Finally, there is a transfer tax of about 5.6 percent of property value (World Bank Group 2015).

Discussion of land tax reform options

Major problems related to the current property and land tax system are the narrow tax base[44], low tax rates[45], low collection efficiency[46] and adverse incentives to register land because of registration fees and higher taxes under the FAT. The government initiated a "Fiscal Decentralization Project" in early 2014 to increase local revenues (Kopanyi 2015). The reform aims at broadening the tax base; increasing tax rates; centralized collection of local taxes by the Rwanda Revenue Authority (RRA); and establishing a cost-efficient tax administration with computerized databases and state of the art filing and collection instruments. The draft law reflects a major policy shift by declaring all fixed assets as subject of taxation, regardless of legal status –whether personal ownership has been registered or not. Although the market value is the general tax base, two forms of taxes are defined: a) property value-based FAT (hereafter VFAT) and b) land area-based FAT (hereafter AFAT) which is linked to market value indirectly[47]. The valuation method will consist of the single-property valuation of market value of fixed assets by the owners and self-filing.

Although the government has followed key recommendations from international experts (Grote, McCluskey, and McPherson 2014) there are still areas that need further refinement and analysis. For example, the IMF strongly suggested a single land-value option compared to the current VFAT based on Rwandan circumstances (the valuation approach is complex, difficult to administer, lacks oversight and quality control and is expensive) (Grote, McCluskey, and McPherson 2014) (Kopanyi 2015). Nevertheless, with the introduction of the parallel VFAT and AFAT taxation, area-based taxation will remain the dominant form of taxation in Rwanda, hence this could be easily shifted towards a land-value tax, as suggested by the IMF. Lastly, current self-assessment has been considered problematic as owners

[44] Only 3% properties are subject to FAT (Grote, McCluskey, and McPherson 2014)

[45] FAT rate is 0.1%, a tenth of the mean international rates.

[46] The percent is unknown due to lack of solid data, but anecdotal evidences suggest no more than 30% (Kopanyi 2015)

[47] Article 10.2: a) "0.2% of the market value of immovable property equal or greater than forty million [40,000,000] Rwandan francs" (Article 10. 1); b) "Immovable property with market value less than forty million [40,000,000], Rwandan francs shall pay tax basing the fixed rate per square meter as determined by the district council basing on the market value of land and its location". The definition of the b) tax rate is implicitly done through calibration by Councils (Kopanyi 2015).

have an incentive to under-report land holdings. Hence, including modern techniques of land valuation can help stabilize the tax base and ensure fair treatment.

Our micro-simulation also reveals that the current property tax system raises less than 0.2 percent of GDP in property taxes, whereas a comprehensive tax on land rents at 25 percent would increase revenues by a factor of 10 (to 1.35 percent of GDP). Thus, extending land taxation would increase government revenues substantially – by 8 to 17 percent (Table 5) which allows for upscaling infrastructure investment in rapidly urbanizing areas but also for reducing income or trade related taxes. Local authorities could also gain higher financial autonomy as revenues from local taxes are in the range of 10-15 percent of total district revenues (Irwin, Fisher, and Pigey 2014), which is below their potential (Cyan, Karuranga, and Vaillancourt 2013). Co-benefits of the envisaged land tax reform relate to improvements in institutional quality by increased land tenure security and transparency by full registration of property. Nevertheless, introducing a uniform land tax would hit poorer households more than wealthier ones (Figure 5) and as a direct consequence increase poverty rates. Using a tax-free amount turns the land tax from a regressive tax to a progressive one. Under the 50 percent non-linear tax rate, households among all income groups do not pay more than 2 percent of their income in terms of land taxes. As the number of households decreases more than the revenues due to the tax exemption, there are additional reductions in relative administrative costs. While total tax revenues also decrease, higher marginal tax rates can compensate this and reduce the revenue-equity trade-off.

4.3.3. Ghana

Main characteristics of current land tenure and land tax regime

Land is held predominantly by customary authorities, such as skins, clans and families. Together they own about 78 percent of all land, while the state owns 20 percent (Larbi 2008). Historic dynamics explain the situation. After independence in 1957, the president was empowered to solely acquire land, essentially via eminent domain, to be managed by the Lands Commission for the public good, e.g. for the provision of roads, schools, and hospitals. The results have been criticized in that communities were unduly disposed and received inadequate refunds for purposes that often benefited the well-connected, which sometimes resulted in social unrest (Kasanga, Kotey, and others 2001; Larbi 2008).

Land titles have been awarded since 1986. However, land titles were awarded non-specifically, e.g. by name of the clan, but not by name of those who have access to the land, which created opportunities for fraud. Customary land has been increasingly changing to individual land titles, in many cases changing secured access for communities to insecure lease-tenure (Kasanga, Kotey, and others 2001). Landlessness is emerging particularly in the process of urbanization at the urban fringe, where previous agricultural customary landholders are excluded from the process of land conversion (Kasanga, Kotey, and others 2001). Such results emerge from the dissolution of the trusteeship principle: customary law managers fail to act as fiduciaries to their community, and instead, act as private landlords. In the high forest zone, sharecropping and lease-holding schemes have been associated with short-rotation farming and deforestation. Hence, increased tenure security can have significant environmental effects at is allows tenants to capture the benefits from ecosystem services due to their own investments in soil and tree planting (Damnyag et al. 2012).

Currently, there is no land rent taxation. However, there are different forms of property taxes in Ghana: property rates, ground rates and the actual property tax. Property rates and ground rates are annually paid on both residential and commercial real estate. While the former are paid to local governments, ground rates are paid to the central authority). Additionally, the property tax is an annual tax charged on all immovable property, including land (International Property Tax Institute 2016). It is administered by the local authority, which is also in charge of assessing property values and defining tax rates within a range between 0.5 percent to 3 percent (Global Property Guide 2016). Recently, however, rates in some

parts of Accra have increased up to 3 percent of the property value. Hence, the property tax bill depends as much on the location as on the value of the property. On the face of a bill, in addition to general information, there is property-based information. First, the rentable value is the value of the property, certified by the Land Valuation Board. Second, the rate impost is the percentage rate charged on a property´s value, and depends on the classification of the zone in which the property is situated and the purpose for which the property is used. However, if the current charge (the product of the ratable value and the rate impost is less than the minimum charge defined for that rating zone, the *minimum charge* applies (Global Property Guide 2016; PwC 2016).

Finally, 8 percent of rental income is taxed (Lamudi 2016) and there is also a stamp duty, i.e. a tax on documents created for the purposes of recording transactions. It is charged on conveyance or sale of immovable property at an applicable rate ranging from 0.25 percent to 1 percent and 0.05 Ghana cedi (GHS) to GHS 25, depending on the type of transaction and the instrument. Similarly, the stamp duty on leases applies rates that range from 0.5 percent to 1 percent of the consideration, but are also dependent on the lease period (Deloitte 2016).

Discussion of land tax reform options

Government is mandated to allocate a proportion of collected national revenue to the local assemblies to drive development. In this way, cities and towns have no incentive to increase local taxes, as transfers from central government are high. There are some local expert voices advocating for land taxation on idle lands to compel people to develop their lands "rather than leaving them idle and creaming off profits when the value has increased and just have to sell them" (International Property Tax Institute 2016). Hence, land taxes might also be used as an instrument to curb land speculation.

Land rent taxation would need to build on a more accurate system of land titles. If such a system would protect the customary rights of all members of a community, this would clearly be beneficial, and would be most attractive in the peri-urban regions of the south. Formal land title has been identified as particularly important for women in the context of climate adaptation, e.g. to secure credits for adaptation action (Antwi-Agyei, Dougill, and Stringer 2015). However, improving women's access to land, e.g. by changes in inheritance law, can only go so far if social norms on gendered access to land continue to discriminate against women, especially on customary land (Lambrecht 2016).

Comprehensive land reform is challenging in that it would need to work with partially dysfunctional institutions, like the Lands Commission, and would be well advised to respect the sometimes well-designed regional community specifications of customary land. Land rent taxation would be most straightforward in urban and peri-urban areas, where land titles are better established and land values are of relevant margins.

4.3.4. Peru

Economic growth in Peru is strongly influenced by international commodity prices: growth jumped to 9 percent per year in 2007 and 2008, driven by higher world market prices for minerals and metals as well as the government's trade liberalisation strategies. After reduced growth in the face of the world recession and lower commodity export prices, the International Monetary Fund (IMF) estimates Peru will achieve a growth rate of 3.7 percent in 2016, and 4.1 percent in 2017, which is above the world average (IMF 2016).

Main characteristics of current land tenure and land tax regime

A wave of land titles granted in the period 1988-1995 under the guidance of Peruvian economist Hernando de Soto during the Fujimori period provided formal land titles to about 1.2 million families. To date, however, more than 70 percent of landholders still lack official proof of their property. High administrative costs for registering land titles are the main obstacle for smallholders and indigenous communities to obtain official approval of their land. Customary law hitherto governs them. Further, social conflicts arise due to claims of extractive industries on land surrounding the area of operation and on indigenous territory (Bebbington and Bury 2009)[48]

The real estate property tax is levied on the value of urban and rural real estate property. The tax rate is set by the national government but is collected by local authorities, as it constitutes one of the main municipal taxes. Municipalities assess the value of the property based on fiscal characteristics (area of land, area of construction, installations, age, etc.), taking into account depreciation (due to age, conservation state, etc.) and unit values (i.e. PEN/m²). The latter two are fixed every fiscal year by the national Ministry for Housing, Construction, and Sanitation (Centro de Gestión Tributaria de Chiclayo 2016; Rojas 2015). Individuals and legal entities owning the referred real estate properties are considered taxpayers for such purposes. Tax rates range from 0.2 percent to 1 percent of the property value and increase progressively with real estate value. Further taxes apply to the transfer of property.

Discussion of land tax reform options

Property taxes on real estate amount to about 0.4 percent of GDP (and roughly 1.5 percent of the public budget) (Ministerio de Economía y Finanzas 2015). Higher revenues from land-related taxes could be used to reduce other distortionary taxes, e.g. VAT or income taxes. Another way in which land tax revenue could increase social welfare could be increased public investment. To date, about 15 percent of the population lacks access to clean water and electricity, and almost 30 percent to sanitation. Access gaps are especially pronounced in rural areas. Additional revenues from land taxation could provide the financial means to close these gaps.

As it is part of the municipal real estate tax, the land tax system can be considered as decentralized, which constrains redistribution across municipalities or administrative regions. The potential of using land tax revenues for improving infrastructure in poor rural areas is therefore limited, as these revenues are typically low in poor areas. Additionally, past experiences with the 'canon minero', which redistributes revenues from taxes and revenues paid by mining companies to the regions and municipalities in which these operations are located, suggest that that those additional funds have tended to yield little benefit for the recipients. This is probably due to limited institutional and administrative capacities to undertake well-targeted investment, as well as incentives to use spending as a device to reward special interest groups (Loayza and Rigolini 2016).

Our quantitative analysis reveals that land taxes might only have a modest role for increasing the government budget since housing rents are low (around 1 percent of GDP) and data on agricultural rents are missing. Nevertheless, land taxes would put a larger burden on poorer households, which may pay up to 2 percent of their income for a 50 percent land tax. Only the non-linear land tax puts a stronger relative burden on richer households.

About 57 percent of Peru's land area is covered by forests and deforestation, but expansion of agricultural land is a major environmental concern. About 10 percent of tropical rainforest had already been lost by 2014. The recently released national strategy on forests and climate change (Ministerio del Ambiente 2016) aims at net zero deforestation by 2021, thereby protecting 3.5 mio hectares of forest

[48] See also the communication by (Colectivo Territorios Seguros del Peru and Plataforma para la Gobernanza Responsable de la Tierra 2014)

until 2030. This goal is to be achieved by improving mapping and monitoring of forests and by providing economic incentives to conserve forest (Ministerio del Ambiente 2016). As discussed in Section 2.3, a land unit tax on agricultural or deforested land could provide an additional incentive to refrain from deforestation, together with mechanisms to actively reward avoided deforestation.

4.3.5. Nicaragua

In Central America, the extraordinary concentration of land ownership in the hands of a small agricultural elite has been seen by both reformers and revolutionaries as a primary cause of the impoverishment of the rural majority, and as a fundamental obstacle to equitable development. With a per-capita GDP of 1,849 USD, Nicaragua is one of the poorest countries on the American continent; six percent of households live below the international poverty line (1.90 USD/day) while half of the rural population lives below the national poverty line (Table 2).

Main characteristics of current land tenure and land tax regime

Nicaragua is characterized by a very unequal distribution of land ownership and high tenure insecurity, reflecting a Gini coefficient of land ownership distribution of 0.86, much higher than in Asian countries (Deininger, Zegarra, and Lavadenz 2003a). In fact, lack of access to land has been determined as a major determinant of poverty (Merlet and Pommier 2000). The country was subject to export-driven boom-and-bust cycles driving land use, dominated in the late 19th by an export boom in coffee; and in the Somoza period from 1936 until 1979 by a livestock and cotton export boom. Notably, these export booms were associated with the appropriation of frontier land by politically well-connected individuals. From 1979 on, the revolutionary Sandista government attempted to change the situation by implementing a land reform program, but effects were small as civil war continued. After the regime change in 1990, conflicting land titles originating from the pre-Sandista and the Sandista period led to partial insecurity in land tenure. A land reform program between 1995 and 2001 provided 30,000 land titles by increasing land tenure security even under otherwise detrimental conditions. Even as land reform is implemented, access to land through inheritance remains fundamental. For example, in the province of Masaya, 40 percent of land was acquired through inheritance, 35% percent through the land reform, and 25% percent through the land market (De Janvry and Sadoulet 2001). Various land market imperfections and land holdings for speculative, status or wealth portfolio reasons by a small land-based elite are considered as impeding the functioning of the agricultural sector and reducing agricultural efficiency (Deininger, Zegarra, and Lavadenz 2003a). This is also reflected by the low yields in Table 2.

Local taxes are relatively high, over 2 percent of GDP (United Cities and Local Governments (UCLG) 2008) and make up a significant portion of total government revenues. Interestingly, property taxes are less important, accounting for around 6 percent of local tax revenues – much less than sales taxes and business taxes (World Bank 2003). The property tax base is the value of land, buildings, and permanent improvements provided by either cadastral value, self-declared value, or estimated value, in order of preference. However, assessed values seem to be well below market values, and it appears to be very difficult to keep values up to date. Property transfers are subject to a transfer tax of 1 to 3 percent on the purchase price, depending on the value of the transferred property. The transfer of property is also subject to a municipal revenue tax (IMI) of 1 percent over the highest value between the purchase price established in the transfer deed and the cadastral value established by the municipality. Stamp taxes or property registration fees are 1 percent, with a maximum amount of USD 1,370. The annual property taxes are typically 1 percent of the taxable value, but since taxable value is set at 80 percent of the cadastral value (or, as the case may be, self-declared value), the effective rate is 0.8 percent. However, many exemptions apply: for example residential properties of less than 10,000 colones (in general) or 40,000 colones (in Managua) are exempt. In rural areas, this exemption may include up to 1 hectare of

land (World Bank 2003).[49] Rental income from property in Nicaragua is taxed as normal income for tax purposes, with a progressive rate for residents of up to 25 percent and a flat rate of 15 percent for non-residents. Finally, a charge of 4 percent is levied on the gift or inheritance of property (International Living 2016; DGI 2017).

Discussion of land tax reform options

A comprehensive reform on land tenure and land taxation can have substantial agricultural co-benefits. Formalizing land titles benefits largely the poor, as they often hold contested land titles and are disproportionally affected by insecure land titles. Taxing land value could reduce speculative and inefficient acquisition of land by the rich, and provide incentives for more productive allocation (Strasma et al. 1987; Deininger, Zegarra, and Lavadenz 2003b).

Our quantitative analysis reveals that agricultural rents contribute to almost 5 percent of GDP while housing land rents contribute to almost 3 percent of GDP (Table 4). Hence, even moderate land tax rates can increase the government budget substantially (Table 5). The direct income effect is, however, strongest for the poorest households where income may decrease between 2 and 4 percent for linear tax rates. This finding seems to be at odds with the existence of a small rural land elite that owns large shares of the land. In fact, our data confirms the existence of such an elite if we look at agricultural land only (see Figure 12 in Appendix 7.9.2): among those households who own agricultural land, the richest 20 percent gain more than one-third of their income from agricultural rents. However, as this agricultural elite is a relatively small part of the top quintile, and as most of the top quintile have urban property captured by the housing component, the agricultural land rents of the rural elite are not directly visible in our statistics on total land rent.

Revenues from land rent taxation could be further used to support smaller farmers with education and access to credit markets. Land taxes could be implemented with few technical barriers as the cadastral valuation methods used already differentiate between structures and land, also with detailed valuation for agricultural land, for both infrastructure in place and terrain characteristics (PGR 2016). Because rural land is rather concentrated in Nicaragua (see Figure 12 in Appendix 7.9.2), a comprehensive land tax reform might provoke substantial resistance from the rural land elite.

4.3.6. Indonesia

Indonesia, which consists of more than 17,000 islands and approximately 250 million people, is the world's fourth-most-populous country. Indonesia had a growth rate of 4.7 percent in 2015. It follows an economic policy of promoting foreign and domestic investment as well as exports of goods other than energy and mineral resources to expedite economic development (PwC, 2015). However, the real estate market is going through a downturn, particularly in large cities due to: a) the significant increase of land prices in the last 5 years; b) recent regulation issued by the central bank, which requires real estate end users to supply a down payment of at least 30 percent as a prerequisite for loans from local banks[50]. Yet, the demand for residential apartments, condominiums and office buildings is still high (Adwani and Ahadu Deradjat 2015).

[49] "Other exemptions include: indigenous communities, associations of municipalities, agricultural cooperative during their first two years, non-profit welfare and social assistance organizations, houses occupied by pensioners, universities and higher technical institutions, cultural, scientific, sport, and artistic institutions, unions and professional and business (non-profit) associations, and enterprises operating in export free zones." (World Bank 2003).

[50] Bank of Indonesia, September 2013

Main characteristics of current land tenure and land tax regime

Indonesia sees land as its most valuable resource, thus the government and National Land Agency aim at developing and managing land for the welfare of the people. Land status is divided in state land and privately used land, with state land accounting for more than two-thirds of total land (which is largely forest land) (Yusuf 2011). Land regulation is extraordinarily complex with an estimated 572 plus laws, regulations, and other documents relating to land and formal government processes. Privately used land consists on land that has, depending on tenure type, certain rights to it attached, regardless of whether it is registered or not.

The National Land Agency (Badan Pertanahan Nasional, BPN) issues the land title certificates that allow the holder to use the land concerned. Cadastral data on land titles registered at the land office is open to the public. They include details on the land and the owner, issue date and period of validity of the land title and historical transfers or any encumbrance (mortgage) over the land title (National Land Agency Indonesia 2016; Center for International Private Enterprise and International Real Property Foundation 2016).

Regional governments may issue regulations on land tenure and taxation, but they should comply with the broad policy guidelines set under Law No. 28 of 2009 regarding Regional Tax and Retribution. The inherent need for periodic renewal of the land title certificate is an automatic process for extracting fees rather than a tool for effective land use management (Yusuf 2011; State of the Republic of Indonesia 1960). Foreign individuals who reside in Indonesia can only hold a right to use of one single residential unit.

Buildings are not legally part of the land and there is a separate title for commercial buildings –i.e. one person's building can exists on another's land (Yusuf 2011). The valuation of land and constructions is the responsibility of regional governments, obtaining the assessed value of the property (NJOP). However, the tax base (NJKP) is a predetermined proportion of the NJOP[51].

Indonesia has a real property tax (Pajak Bumi dan Bangunan/PBB) that consists of two main parts. The first part is a tax on urban and rural land and property, which is under the responsibility of regional governments. This part is commonly known as PBB (P2) (Perkotaan dan Pedesaan/ urban and rural) and is payable annually on land, buildings, and permanent structures. Thresholds are stipulated regionally[52] and tax rates are progressive, with a maximum of 0.3 percent of the assessed value (NJKP)[53][54]. The second part is a tax on plantation, mining, and industrial forest (part of the forest area managed by the private sector under concession from the government), which is under the authority of the central government. This part is commonly known as PBB (P3) (Perkebunan, Pertambangan, and Perhutanan/ plantation, mining, and forestry). Further land or property related taxes or duties apply to the transfer of property and sales of luxury property, as well as income from property rental.

Discussion of land tax reform options

Differentiated land unit taxes could play a larger role in slowing deforestation and directing urban expansion. Indonesia is a global hotspot of deforestation and biodiversity loss, represented by the likely future extinction of the Orang-Utan. Deforestation and land conversion for the creation of largely

[51] NJKP is currently stipulated to be either 20% of NJOP (for NJOP up to IDR 1 billion) or 40% of NJOP (for NJOP above IDR 1 billion).

[52] The non-taxable NJOP is set at IDR 10 million at the minimum. Any changes are to be made by issuing a PERDA. In Jakarta, the non-taxable NJOP is set at IDR 60 million.

[53] For example, if the tax base (NJKP) is stipulated to be 20% of the assessed value (NJOP) (for NJOP up to IDR 1 billion), the application of a tax rate of 0.5%, leads to an effective PBB of 0.1% (properties < IDR 1 billion).

[54] Progressive effective tax rates: IDR (US$) < 200 million (US$14,859): 0,01%; 200 million – 2 billion (US$148,588): 0.1%; 2 billion – 10 billion (US$742,942): 0.2% > 10 billion (US$742,942): 0.3%.

community-owned cropland is primarily driven by land clearance for palm oil plantations, a main export staple crop. Under the business-as-usual scenario, intact forest cover will decline to 4 percent by 2020, but protecting both intact and logged forest can decrease carbon emission reductions of 21 percent (Carlson et al. 2012). Case studies demonstrate that plantation schemes are closely entangled with land tenure (Creutzig et al. 2013). For example, in Jambi province, high capital requirements for plantations crowd out poor settlers even if supported by the government at the beginning, and establishment of large-scale plantations severely compromises land access for customary users, mostly indigenous populations (Creutzig et al. 2013). Governance of equal access to land occurs at the local, national and global scale (i.e. palm oil certification schemes in Europe) (Hunsberger et al. 2014). While deforestation involves environmental costs, urbanization may have adverse effects on food supply: urbanization is projected to consume 0.6Mha of cropland (1.1 percent of Indonesia's cropland), which is twice as productive as the average cropland in Indonesia (Brend'Amour et al. 2016). Differentiated land unit taxes on agricultural land could help reduce area expansion and deforestation; if taxes on housing land are substantially higher than on agricultural land, they could also help slow down urban sprawl. In any case, a simultaneous regulatory framework on land uses needs to be in place, as land taxes may only help shift incentives but constitute in rare cases hard constraints on land use change. A crucial issue here is also the political will to limit deforestation, as communities might also benefit from land conversion.

Currently, land and building taxes are roughly 4 percent of all tax revenues and 0.7 percent of GDP (Amir, Asafu-Adjaye, and Ducpham 2013b) although tax revenues from recurrent property taxes are reported to be only 0.2 percent of GDP according to OECD.Stat (see Table 3). Our analysis highlights the minor role of agricultural land rents for Indonesian households as agricultural land rents represent less than 1 percent of GDP. Housing rents reach almost 2 percent of GDP. A 25 percent land rent tax would generate tax revenues of almost 0.9 percent of GDP and (1.7 percent for a 50 percent tax rate). Hence, Indonesia seems to already capture a substantial share of land rents, though land tax revenues from large domestic and foreign agricultural companies and state-owned enterprises are not covered by our simulation. In general, experts see more potential to increase tax revenues because local governments have low capacity to enforce tax collection, face strong opposition and low acceptance in dealing with sizable tax liabilities (Von Haldenwang 2015). According to our simulations, land taxes would also be regressive, as they would reduce income of the poorest households by 5 percent for a 50 percent tax rate. Non-linear taxes would almost completely exempt poor households and result in an increasing tax burden over the different income quintiles.

There are frequent coordination problems between tax agencies, the agricultural department, the national land agency and the relevant work units of local governments to harmonize data and enforce compliance.[55] As the government is facing difficulties in meeting its 2015 revenue target, it is working together with the House of Representatives on the Bill of Land to revise the financial transactions involving property. At this stage, it is not clear when the Bill of Land will be enacted into law, since discussions are still ongoing (National Land Agency Indonesia 2016; Adwani and Ahadu Deradjat 2015). As the main motivation for this reform is driven by revenue raising, the focus is mainly on housing properties, hence it does not consider other land uses that are quite relevant for the Indonesian case.

However, Indonesia illustrates the challenges of a country faced with management issues regarding its significant forest and natural resources and the problems that may be associated with legal pluralism, that is, the coexistence of the national state law with customary laws (adat) that govern Indonesia's traditional communal land tenure system. In this context, many opportunities exist for Indonesia to overcome obstacles that prevent economic actors from gaining more secure rights to land and, thus, for society to fully benefit from the advantages of land as a safety net and to respond to incentives for sustainable management and investment (Delninger, Selod, and Burns 2011). Hence, over the last few years, changes in the policies, practices and legal framework at the regional level have taken place very quickly. New issues and initiatives such as the insistence on recognition of adat community rights, efforts to settle and resolve land conflicts, and REDD+ try to address environmental and social issues (Earth Innovation Institute 2015; Busch et al. 2012; Carlson et al. 2012). They have also impacted the

[55] See, e.g. : http://www.antaranews.com/berita/580547/kpk-hanya-sepertiga-perusahaan-sawit-yang-kena-pajak

composition and character of the law and policies. Regions issue policies that are inconsistent with national regulations, while the national framework does little to accommodate the progressive dynamics of land management at the regional level (Earth Innovation Institute 2015). In spite of unique regional practices, a national reform towards a land tax that includes all land uses may be the required method for including all non-monetary values in the land market.

4.3.7. Vietnam

Main characteristics of current land tenure and land tax regime

Vietnam offers a splendid window into the complex and intricate dynamics of land tenure arrangements. In pre-colonial times, traditional village arrangements granted tillers usufruct rights (even as the local landlord appropriated the surplus as a monopolist). French colonial rule brought administration, legal enforcement and market economics to Vietnam, inciting an ultimately unsuccessful peasant revolution, , even as peasants were supposed to be freed. The reason behind this uprising was not a higher average rate of exploitation, but rather the clash of peasant needs with those of a modern state. The state required constant income realized by constant tax rates on land and heads. But the farmers viewed this arrangement unfavorably, as it would severely compromise their subsistence needs in times of climatic or socio-economic crisis[56]. The ignorance of a system that could not understand the need for minimum subsistence income resulted in moral outrage with peasants risking their lives in a revolution that was bound to fail (Scott 1977).

In colonial times, farmland was owned by only a few French plantation owners or Vietnamese landlords, while 60 percent of farmers were landless (Do and Iyer 2008). When colonial rule ended in 1954, Vietnam split into northern and southern parts, and land began to be collectivized in North Vietnam in accordance with communist ideology. 68 percent of total farmland was brought into cooperatives by 1960. In South Vietnam, pro-landowner policies were adopted and ownership rights for cultivators were granted (Land-to-Tiller law) to increase the popularity of the government during the Vietnam War. However, landlords successfully opposed its implementation. In 1975, the country was reunified and land collectivization also started in the south, but with little success.

Land tenure and incentives for agricultural activity were dismal in the 1980s, to the point that Vietnam even needed to import rice. This started to change with a new law in 1988 that granted land use rights to individual households. Specifically, land was allocated to households with 10-15 years of secure tenure but no possibilities to trade such land use rights. In 1993, the land law made these rights pledgeable and tradable (that is, land use rights could be inherited, transfered, exchanged, leased and mortgaged). However, a high transaction tax of 10 percent, implemented until 1999, led to very low turnover of land.

The 1993 law that made land tradable lead to a small but statistically significant change in crop choice and long-term agricultural investment (Do and Iyer 2008). Importantly, female-only held land use rights (but not male or jointly held land use rights) reduced the incidence of children's illness, increased school enrollment, and reduced household's drug expenditure (Menon, Van Der Meulen Rodgers, and Nguyen 2014). A change in law by form only in 2003, which specified that land titles must also bear the name of the spouse (nearly always the woman), translated into more bargaining rights for women and resulted in lower participation of girls in agricultural production but significantly higher educational attainment (Matz and Narciso 2010). In 2013, the National Assembly further approved the Revised Land Law, which will give farmers *50-year* use rights to all their agricultural land, including their basic, annual-cropland. Furthermore, the state supports infrastructure investments, science and the application of modern

[56] This ‚moral economy' perspective is critically discussed in the political economy literature pointing to the importance of individual decision making in corporate villages (Popkin 1979).

technology for paddy rice to increase yield and quality (Phuoc et al. 2016; Cong Thang and Bao Linh 2014). In this sense, the most notable benefits might be only visible in differential analysis of a comprehensive set of welfare analysis, and might only fully unfold over time.

Discussion of land tax reform options

Since 1993, the Agricultural Land Tax applies to all organizations and individuals using land for agricultural production including cultivated land, water surfaces used for aquaculture, forestry land, and other businesses that are allocated agricultural land). It is based on the productive capacity of the land expressed in kilograms of rice. Following international trends to reduce tax burdens on agricultural producers, the government introduced a 50 percent exemption to all taxpayers and a full exemption applicable to the following cases: the "standard" and unit assigned to agricultural families, poor communities and agricultural cooperatives (Cong Thang and Bao Linh 2014). Crucially, these policies, together with land use charges and registration fees, land use right transfers and sales of state-owned houses and land rent taxes on agricultural and housing land, lack buoyancy and represent a declining revenue base (William J. McCluskey and Trinh 2013). To address these shortcomings, the government decided to replace the pre-existing rice-based tax on land and housing[57] to one based on an estimate of land and property value. Two options were considered: an area-based approach that includes both land and buildings, and an approach based only on land value(SCNP 2010). In 2010, the National Parliament approved Law number 48/2010/QH12, which created the Non-Agricultural Land Use Tax, i.e. a land value tax (VNP 2010).

The newly adopted Non-Agricultural Land Use Tax applies to residential, commercial and industrial land (where agricultural land, improvements and structures are exempted). This means that only 4 percent of the total area of land is subject to the land tax (William J. McCluskey and Trinh 2013; GSO 2011). The tax base is an adjusted value defined by multiplying the land area by the land tariff, as determined by the local and/or regional authorities. This tariff remains fixed for a period of 5 years. The tax rate is a progressive rate ranging from 0.03 percent to 0.15 percent[58] for residential property and a flat rate of 0.03 percent for commercial and industrial land (PwC 2016). Finally, rental income taxes are levied on the average annual income on a rental apartment/property (the sale and rent of buildings is subject to a VAT of 10 percent.).

Recent work by (William J. McCluskey and Trinh 2013) simulates the revenues of the new land tax compared to the old system. Their results show an increase only from 0.06 percent to 0.08 percent of GDP for the year 2008, assuming a 60 percent revenue collection level[59]. Furthermore, given the fixed nature of the tax rates and land value tariffs, nominal revenue as a percentage of GDP declines in the following years. The desirability of an adjustment to the current tax reform comes from stabilizing revenues, which are currently still declining, by addressing several structural problems that will directly enhance revenue buoyancy. The choice of a land tax is in many respects the optimal choice, and the revenue performance is modest but has room for future growth (William J. McCluskey and Trinh 2013).

---

[57] The Land and Housing Tax was introduced in 1992. It applied to residential, commercial and industrial land. The tax base was determined on the basis of there factors: land surface, its rice-based productivity and a variable coefficient between 3 and 30 applied progressively according to the value of the urban land. This tax faced crucial problems derived from the arbitrary nature of the coefficients given their weak correlation with market land values. Furthermore, the fact that the tax liability was directly linked with the price of rice brings food-security related issues upfront. The purpose of this tax was to raise revenue enough to finance development infrastructure and public services. Although revenues have been constantly rising since 1996,they stagnated at 0.06% GDP, with low chances for a significant increase given its design, unable to capture the growth in residential and commercial real estate values (William J. McCluskey and Trinh 2013).

[58] 0.03 percent: Area within standard; land used for underground construction or multiple apartment buildings.
0.07 percent: area greater than standard but not exceeding 3 times the standard.
0.15 percent: area exceeding 3 times the standard; unused land; land use for inappropriate purposes.
0.20 percent: Illegally used land. Source: (VNP 2010; William J. McCluskey and Trinh 2013).

[59] Collections ratios in developing countries are typically around 60–80% (Kelly 2000).

In moving forward, Vietnam urgently needs to increase its human capacity for valuation through the creation of appropriate structures for the education and training of appraisers. The immaturity of the property market and poorly-established land tenure system indicates that the selected tax reform using an area based approach would be even more successful (Rao 2008). A further step would be to consider higher tax rates, as current rates (limited to a maximum 0.15 percent) seem to have difficulties in fulfilling the revenue raising requirements. Further changes would also require government intervention in terms of providing an accessible banking system. Land rights must be complemented with the ability to make use of them.

5. Conclusions

In this paper, we re-examined an old claim in economics that using land taxes is a first-best choice of government finance with respect to the particular situation of developing countries. A major advantage of taxes that capture land rents is their economic efficiency, as deadweight losses are zero due to the fixed tax base. This efficiency advantage could be higher for developing countries than for developed countries because of the existence of a large informal sector. The marginal cost of funds of taxes that apply to activities, goods or services in the formal economy increases if activities can be shifted into the informal sector.

The revenue potential of land taxes is difficult to assess, as different methods and data sets yield different estimates of land rents. Macro-estimates on agricultural land rents based on revenues and production costs tend to provide larger numbers (up to 10 to 20 percent of GDP) than estimates based on household data (around 1 to 5 percent of GDP). While household data is subject to underreporting, macro-estimates consider neither location-specific rents nor ownership and distribution of rents. Additionally, household data do not include the land rents that accrue to large commercial firms, foreigners or state-owned enterprises. Reliable macro-estimates on urban land rents are not available at all. Our estimates based on the household data suggest urban land rents to be around 1 to 3 percent of GDP. Hence, total land rents form up to 7 percent of total income if only rent income of households is considered. This is a large potential for land taxes to become a relevant source of government revenue. Taxing half of these rents increases government budgets by 15 percent for several of our considered case study countries. These additional revenues are highly needed for increasing investments in infrastructure to address development goals and continue urbanization trends.

Besides their efficiency properties, land taxes provide a number of co-benefits: depending on their design as a unit tax or differential tax, they can alter land use dynamics, reduce area expansion and provide higher incentives to put land under to most efficient use. Holding back land due to speculative or other motives is a concern in several countries, including Nicaragua or Ghana. Land taxes might therefore not only be relevant in countries that aim to reduce deforestation or urban sprawl, but also in regions where land is idle or is not used productively.

The large revenue potential is in stark contrast to the currently low revenues from land-based taxes in developing countries that are far below 1 percent of GDP (around 0 to 0.2 percent of GDP in our case study countries). Also, land taxes are hardly used as a tool for environmental or spatial planning policy. Why is this great potential not used so far? There are various explanations ranging from high administrative costs and compliance problems to political economy and distributional aspects. While some of them are valid, others lack a rigorous base or can in principle be addressed with reasonable effort.

High administrative costs of setting up and running a land registry, assessing land values and enforcing compliance are a widespread argument against land and property taxes. Looking into actual costs, however, reveals that administrative costs are of similar magnitude as other taxes. Moreover, it is low tax rates that contribute to an unfavorable cost-to-collection ratio for property or land taxes. The costs of

setting up land registries and formalizing land tenure are moderate – they are not only overcompensated by tax revenues (often within the first year), but also provide substantial co-benefits with respect to sustainable land use, investments and access to credit. Further options to reduce administrative costs include using unit taxes that are differentiated among broader spatial units and not on valuation of individual plots and excluding smaller plots from paying the tax at all (which is already implemented in Vietnam based on a "standard" assignation to poorer households). Additionally, remote sensing techniques and statistical approaches can be useful for large countries while hybrid or self-reporting approaches can be particularly useful for smaller countries.

Compliance and low taxpayer morale is a major issue in many developing countries. However, compliance problems of land taxes need to be evaluated against compliance and evasion problems of alternative taxes like income, value added or trade taxes. All of these taxes suffer from substantial evasion no smaller than that of land or property taxes. Compliance can be increased substantially by improving the quality of the land tax authority and providing appropriate incentives. As property is visible, land and property taxes are in principle more difficult to evade than taxes on consumption, income or goods.

While administrative costs and compliance problems cannot be considered as hard constraints for land tax implementation, political economy can indeed be considered as such. In most countries, land taxes are regulated and collected by local authorities and are hence part of a fiscal decentralization approach. If central governments are reluctant to empower local authorities, land and property taxes will not enjoy the support they need. The household data reveals, however, that land ownership and also land rent income is rather uniformly distributed among the income classes, except for agricultural land in Nicaragua. Hence, the tax would be carried by a large share of the population. This creates 'ownership' in the tax which improves public spending as taxpayers held their (local) government accountable for the taxes they pay. If land is owned by powerful elites, like in rural Nicaragua, or protected by international agreements on foreign land investment, land taxation will face severe opposition. Gradual reform with low tax rates that increase slowly over long time periods can be more feasible in such contexts.

Finally, as the household data for our case study countries reveal, land ownership is prevalent among all income groups in developing countries, including the poorest households. Moreover, in many cases a linear land tax would put a larger relative tax burden on the poor than on wealthier countries. Hence, land taxes (if not compensated by additional measures) have adverse effects on the poor and might even increase poverty rates. Exempting small land holdings from land taxation does not only reduce the cost-to-collected-revenue ratio, but also further prevents poor households from being adversely affected by the tax and turns the tax into a progressive one. Non-linear or progressive schemes for land or property taxes are already used in Rwanda, Nicaragua, Vietnam, and Indonesia. Earmarking tax revenues for investments in pro-poor (local) infrastructure and improvements in local amenities further reduces adverse effects on the poor and increases acceptance, as taxpayers directly enjoy the benefits.

The experience with land taxes in developing countries – as well as with property taxes which share some of the characteristics of land taxes but additionally tax investments – shows that they can be part of a fiscal strategy to diversify government revenues, increase the tax base and reduce the deadweight losses of distortionary taxes. But land tax reforms are also one step towards comprehensive green tax reforms where increasingly natural resource rents and environmental externalities are taxed. According to the World Bank (2011b), natural resource rents in 2010 amounted to more than US$ 3 trillion globally. Despite the volatility of natural resource prices, revenues of this magnitude could, if employed properly on the domestic level, eradicate large parts of global poverty and inequality (Segal 2011) and finance access to basic infrastructure (Fuss et al. 2016). Energy subsidies constitute on average 5 percent of GDP in Sub-Sahara Africa (Coady et al. 2015). Phasing out fossil fuel subsidies and putting a price on carbon are crucial policy instruments for reducing carbon emissions and complying with the nationally determined contributions (NDCs) announced for the Paris agreement.

International development cooperation could play an important role in supporting the build-up of the required institutional capacity (VanDeveer and Dabelko 2001) in line with the Addis Ababa convention to make fiscal systems more broad, fair and efficient.

6. References

Abdulai, Awudu, and Renan Goetz. 2014. "Time-Related Characteristics of Tenancy Contracts and Investment in Soil Conservation Practices." *Environmental and Resource Economics* 59 (1): 87–109. doi:10.1007/s10640-013-9719-y.

Abdulai, Awudu, Victor Owusu, and Renan Goetz. 2011. "Land Tenure Differences and Investment in Land Improvement Measures: Theoretical and Empirical Analyses." *Journal of Development Economics* 96 (1): 66–78. doi:10.1016/j.jdeveco.2010.08.002.

Adwani, Nafis, and Ahadi Ahadu Deradjat. 2015. "Commercial Real Estate in Indonesia: Overview." MMCorporate Real Estate Global Guide 2015/16. Thomson Reuters and Association of Corporate Council.

AgboKlu, George. 2013. "How A Property Rate Bill Is Computed In Accra, Ghana." *Labone Express*. August 18. http://laboneexpress.com/blog/2013/08/how-property-rate-bill-computed-in-accra-ghana/.

Ahmad, Ehtisham, and Giorgio Brosio. 2009. *Does Decentralization Enhance Service Delivery and Poverty Reduction?* Edward Elgar Publishing.

Akai, Nobuo, and Masayo Sakata. 2002. "Fiscal Decentralization Contributes to Economic Growth: Evidence from State-Level Cross-Section Data for the United States." *Journal of Urban Economics* 52 (1): 93–108.

Ali, Daniel Ayalew, Klaus Deininger, and Markus Goldstein. 2014. "Environmental and Gender Impacts of Land Tenure Regularization in Africa: Pilot Evidence from Rwanda." *Journal of Development Economics* 110: 262–75.

Alonso, W. 1964. "Location and Land Use: Toward a General Theory of Land Rent." *Harvard Univ. Press*.

Amir, Hidayat, John Asafu-Adjaye, and Tien Ducpham. 2013a. "The Impact of the Indonesian Income Tax Reform: A CGE Analysis." *Economic Modelling* 31: 492–501.

———. 2013b. "The Impact of the Indonesian Income Tax Reform: A CGE Analysis." *Economic Modelling* 31: 492–501.

Andelson, Robert V. 2001. *Land-Value Taxation Around the World: Studies in Economic Reform and Social Justice*. Auflage: Revised. Malden, MA: Blackwell Publ.

Anderson, Kym, and William A Masters. 2009. *Distortions to Agricultural Incentives in Africa*. World Bank Publications.

Antwi-Agyei, Philip, Andrew J. Dougill, and Lindsay C. Stringer. 2015. "Impacts of Land Tenure Arrangements on the Adaptive Capacity of Marginalized Groups: The Case of Ghana's Ejura Sekyedumase and Bongo Districts." *Land Use Policy* 49: 203–12. doi:10.1016/j.landusepol.2015.08.007.

Arnold, Jens. 2008. "Do Tax Structures Affect Aggregate Economic Growth?: Empirical Evidence from a Panel of OECD Countries." *OECD Economics Department Working Papers* 643.

Auriol, Emmanuelle, and Michael Warlters. 2012. "The Marginal Cost of Public Funds and Tax Reform in Africa." *Journal of Development Economics* 97 (1): 58–72.

Bahl, Roy W, Jorge Martinez-Vazquez, and Joan M Youngman. 2008. *Making the Property Tax Work: Experiences in Developing and Transitional Countries*. Lincoln Inst of Land Policy.

Bandyopadhyay, Simanti. 2014. "Impact of Area Based Valuations in Property Taxation: A Tale of Two Indian Cities." *Journal of Property Tax Assessment & Administration* 11 (4): 35.

Banzhaf, H Spencer, and Nathan Lavery. 2010. "Can the Land Tax Help Curb Urban Sprawl? Evidence from Growth Patterns in Pennsylvania." *Journal of Urban Economics* 67 (2): 169–79.

Barros, VR, CB Field, DJ Dokke, MD Mastrandrea, KJ Mach, TE Bilir, M Chatterjee, KL Ebi, YO Estrada, and RC Genova. 2014. "Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change."

Barua, Sepul K, Jussi Lintunen, Jussi Uusivuori, and Jari Kuuluvainen. 2014. "On the Economics of Tropical Deforestation: Carbon Credit Markets and National Policies." *Forest Policy and Economics* 47: 36–45.

Barua, Sepul K, Jussi Uusivuori, and Jari Kuuluvainen. 2012. "Impacts of Carbon-Based Policy Instruments and Taxes on Tropical Deforestation." *Ecological Economics* 73: 211–219.

Baskaran, Thushyanthan, and Lars P Feld. 2013. "Fiscal Decentralization and Economic Growth in OECD Countries Is There a Relationship?" *Public Finance Review* 41 (4): 421–45.

Bebbington, A. J., and J. T. Bury. 2009. "Institutional Challenges for Mining and Sustainability in Peru." *Proceedings of the National Academy of Sciences* 106 (41): 17296–301. doi:10.1073/pnas.0906057106.

Bell, Michael E., John H. Bowman, and Jerome C. German. 2009. "The Assessment Requirements for a Separate Tax on Land." In *Land Value Taxation: Theory, Evidence, and Practice*, 129–94. Cambridge, Mass.: Lincoln Institute of Land Policy.

Benedek, Dora, Ernesto Crivelli, Sanjeev Gupta, and Priscilla Muthoora. 2014. "Foreign Aid and Revenue: Still a Crowding-out Effect?" *FinanzArchiv: Public Finance Analysis* 70 (1): 67–96.

Bento, Antonio M, Sofia F Franco, and Daniel Kaffine. 2011. "Is There a Double-Dividend from Anti-Sprawl Policies?" *Journal of Environmental Economics and Management* 61 (2): 135–152.

Bird, Richard M. 2011. "Subnational Taxation in Developing Countries: A Review of the Literature." *Journal of International Commerce, Economics and Policy* 2 (1): 139–61.

Bird, Richard Miller, and Naomi Enid Slack, eds. 2004. *International Handbook of Land and Property Taxation*. Cheltenham: Elgar.

Blaikie, Piers, and Harold Brookfield. 2015. *Land Degradation and Society*. Routledge.

BlažiX, Helena, Sandra StašiX, and Saša DrezgiX. 2014. "The Administrative Costs of Local Government Property-Based User Charges and Their Regressivity." *International Public Administration Review* 9 (4). http://uprava.fu.uni-lj.si/index.php/IPAR/article/view/189.

Boadway, Robin, Maurice Marchand, and Pierre Pestieau. 1994. "Towards a Theory of the Direct-Indirect Tax Mix." *Journal of Public Economics* 55 (1): 71–88.

Booth, Anne. 2014. "Land Taxation in Asia: An Overview of the 19th and 20th Centuries." *Oxford Development Studies* 42 (1): 1–18. doi:10.1080/13600818.2014.880413.

Bourassa, Steven C. 2009. "The Political Economy of Land Value Taxation." In *Land Value Taxation: Theory, Evidence, and Practice*, 129–94. Cambridge, Mass.: Lincoln Institute of Land Policy.

Brandt, Nicola. 2014. "Greening the Property Tax." *OECD Working Papers on Fiscal Federalism*, no. 17.

Brend'Amour, Christopher, Femke Reitsma, Giovanni Baiocchi, Stephan Barthel, Burak Güneralp, Karl-Heinz Erb, Helmut Haberl, Felix Creutzig, and Karen C. Seto. 2016. "Future Urban Land Expansion and Implications for Global Croplands." *Proceedings of the National Academy of Sciences*, December, 201606036. doi:10.1073/pnas.1606036114.

Browning, Edgar K. 1976. "The Marginal Cost of Public Funds." *The Journal of Political Economy*, 283–298.

Brueckner, Jan K. 2001. "Urban Sprawl: Lessons from Urban Economics." *Brookings-Wharton Papers on Urban Affairs* 2001 (1): 65–97.

Bucks, Brian K., Arthur B. Kennickell, and Kevin B. Moore. 2006. "Recent Changes in US Family Finances: Evidence from the 2001 and 2004 Survey of Consumer Finances." *Fed. Res. Bull.* A1 92. http://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/fedred92&section=2.

Busch, Jonah, Ruben N Lubowski, Fabiano Godoy, Marc Steininger, Arief A Yusuf, Kemen Austin, Jenny Hewson, Daniel Juhn, Muhammad Farid, and Frederick Boltz. 2012. "Structuring Economic Incentives to Reduce Emissions from Deforestation within Indonesia." *Proceedings of the National Academy of Sciences* 109 (4): 1062–1067.

Cao, Liangyue, Amanda Hosking, Michael Kouparitsas, Damian Mullaly, Xavier Rimmer, Qun Shi, Wallace Stark, and Sebastian Wende. 2015. "Understanding the Economy-Wide Efficiency and Incidence of Major Australian Taxes." *Australian Government Treasury Working Paper* 2015–01 (April). http://treasury.gov.au/PublicationsAndMedia/Publications/2015/working-paper-2015-01.

Carlson, Kimberly M., Lisa M. Curran, Dessy Ratnasari, Alice M. Pittman, Britaldo S. Soares-Filho, Gregory P. Asner, Simon N. Trigg, David A. Gaveau, Deborah Lawrence, and Hermann O. Rodrigues. 2012.

"Committed Carbon Emissions, Deforestation, and Community Land Conversion from Oil Palm Plantation Expansion in West Kalimantan, Indonesia." *Proceedings of the National Academy of Sciences* 109 (19): 7559–64. doi:10.1073/pnas.1200452109.

Center for International Private Enterprise, and International Real Property Foundation. 2016. "International Property Markets Scorecard - Indonesia Market Conditions – Desktop Survey July 2014." http://www.propertymarketsscorecard.com/.

Centro de Gestión Tributaria de Chiclayo. 2016. "Impuesto Predial - Información." http://www.satch.gob.pe/informacionTribNoTrib/impuestoPredial/preguntasFrecuentes.php.

Chapman, Jeffrey I, Robert J Johnston, and Timothy J Tyrrell. 2009. "Implications of a Land Value Tax with Error in Assessed Values." *Land Economics* 85 (4): 576–86.

Choi, Ki-Whan, and David L Sjoquist. 2015. "Economic and Spatial Effects of Land Value Taxation in an Urban Area: An Urban Computable General Equilibrium Approach." *Land Economics* 91 (3): 536–55.

Coady, David, Ian Parry, Louis Sears, and Baoping Shang. 2015. "How Large Are Global Energy Subsidies?" International Monetary Fund.

Colectivo Territorios Seguros del Peru, and Plataforma para la Gobernanza Responsable de la Tierra. 2014. "New Law in Peru to Severely Curtail Land Rights for Indigenous Peoples and Smallholder Farmers." August 28. http://rightsandresources.org/en/news/new-law-in-peru-to-severely-curtail-land-rights-for-indigenous-peoples-and-smallholder-farmers/.

Cong Thang, Tran, and Dinh Bao Linh. 2014. "Agricultural Land Policies in Vietnam." *FFTC Agricultural Policy Platform*. October 13. http://ap.fftc.agnet.org/ap_db.php?id=304.

Cordano, Arturo L Vásquez, and Edward J Balistreri. 2010. "The Marginal Cost of Public Funds of Mineral and Energy Taxes in Peru." *Resources Policy* 35 (4): 257–64.

Cotula, Lorenzo, and Thierry Berger. 2015. "Land Deals and Investment Treaties: Visualising the Interface." IIED Land, Investment and Rights Series. London, UK: International Institute for Environment and Development (IIED).

Craig, Barbara J, Philip G Pardey, and Johannes Roseboom. 1997. "International Productivity Patterns: Accounting for Input Quality, Infrastructure, and Research." *American Journal of Agricultural Economics* 79 (4): 1064–76.

Creutzig, Felix, Esteve Corbera, Simon Bolwig, and Carol Hunsberger. 2013. "Integrating Place-Specific Livelihood and Equity Outcomes into Global Assessments of Bioenergy Deployment." *Environmental Research Letters* 8 (3): 35047. doi:10.1088/1748-9326/8/3/035047.

Cyan, M., C. Karuranga, and F. Vaillancourt. 2013. "Local Government Revenue Potential in Rwanda." Georgia State University, US: Andrew Young School of Policy Studies.

Damnyag, Lawrence, Olli Saastamoinen, Mark Appiah, and Ari Pappinen. 2012. "Role of Tenure Insecurity in Deforestation in Ghana's High Forest Zone." *Forest Policy and Economics* 14 (1): 90–98. doi:10.1016/j.forpol.2011.08.006.

Davoodi, Hamid, and Heng-fu Zou. 1998. "Fiscal Decentralization and Economic Growth: A Cross-Country Study." *Journal of Urban Economics* 43 (2): 244–57.

De Cesare, Claudia M. 2010. "Overview of the Property Tax in Latin America." *Inventory ID WP10CD1 (Documento de Trabajo de 31 Pp.). Cambridge, MA: Lincoln Institute of Land Policy*.

De Groot, Rudolf, Luke Brander, Sander Van Der Ploeg, Robert Costanza, Florence Bernard, Leon Braat, Mike Christie, et al. 2012. "Global Estimates of the Value of Ecosystems and Their Services in Monetary Units." *Ecosystem Services* 1 (1): 50–61.

De Janvry, Alain, and E Sadoulet. 2001. *Access to Land and Land Policy Reforms*. http://www.staff.ncl.ac.uk/david.harvey/AEF806/AccessToLand.pdf.

Deaton, Angus. 2003. "Household Surveys, Consumption, and the Measurement of Poverty." *Economic Systems Research* 15 (2): 135–59. doi:10.1080/0953531032000091144.

DeFries, Ruth S, Thomas Rudel, Maria Uriarte, and Matthew Hansen. 2010. "Deforestation Driven by Urban Population Growth and Agricultural Trade in the Twenty-First Century." *Nature Geoscience* 3 (3): 178–81.

Deininger, Klaus, and Derek Byerlee. 2011. *Rising Global Interest in Farmland: Can It Yield Sustainable and Equitable Benefits?* World Bank Publications.

Deininger, Klaus, and Gershon Feder. 2009. "Land Registration, Governance, and Development: Evidence and Implications for Policy." *The World Bank Research Observer* 24 (2): 233–66.

Deininger, Klaus, Eduardo Zegarra, and Isabel Lavadenz. 2003a. "Determinants and Impacts of Rural Land Market Activity: Evidence from Nicaragua." *World Development* 31 (8): 1385–1404.

———. 2003b. "Determinants and Impacts of Rural Land Market Activity: Evidence from Nicaragua." *World Development* 31 (8): 1385–1404.

Del Carpio, Lucia. 2013. "Are the Neighbors Cheating? Evidence from a Social Norm Experiment on Property Taxes in Peru Job Market Paper."

Delninger, Klaus, Harris Selod, and Anthony Burns. 2011. "Applying the Land Governance Assessment Framework in Practice: Evidence from Five Pilot Cases." In .

Deloitte. 2016. "Guide to Fiscal Information: Key Economies in Africa 2015-2016." Guide to Fiscal Information. Deloitte: Tax Division. http://www2.deloitte.com/za/en/services/tax/tools-and-publications.html.

———. 2017. "Vietnam Highlights 2017." International Tax. International Tax. Deloitte: Tax Division. https://dits.deloitte.com/#TaxGuides.

Devamjan, Shantayanan, Karen E Thieefelder, and Sethoput Suthiwact-Nasueput. 2002. "The Marginal Cost of Public Funds in Developing Countries." *Policy Evaluation with Computable General Equilibrium Models* 1: 39.

DGI. 2017. "Descripción General de Los Impuestos Aplicados En Nicaragua." *Dirección General de Ingresos DGI - República de Nicaragua*. http://www.dgi.gob.ni/interna.php?sec=109.

DiMasi, Joseph A. 1987. "The Effects of Site Value Taxation in an Urban Area: A General Equilibrium Computational Approach." *National Tax Journal* 40 (4): 577–90.

———. 1988. "Property Tax Classification and Welfare in Urban Areas: A General Equilibrium Computational Approach." *Journal of Urban Economics* 23 (2): 131–49. doi:10.1016/0094-1190(88)90010-1.

Do, Quy-Toan, and Lakshmi Iyer. 2008. "Land Titling and Rural Transition in Vietnam." *Economic Development and Cultural Change* 56 (3): 531–579.

Duchelle, Amy E, Marina Cromberg, Maria Fernanda Gebara, Raissa Guerra, Tadeu Melo, Anne Larson, Peter Cronkleton, Jan Börner, Erin Sills, and Sven Wunder. 2014. "Linking Forest Tenure Reform, Environmental Compliance, and Incentives: Lessons from REDD+ Initiatives in the Brazilian Amazon." *World Development* 55: 53–67.

Dye, Richard F., and Richard W. England. 2010. "Assessing the Theory and Practice of Land Value Taxation." Policy Focus Report PF025. Cambridge, MA: Lincoln Institute of Land Policy.

Earth Innovation Institute. 2015. "Central Kalimantan Land Governance Assessment." Earth Innovation Institute.

Edenhofer, Ottmar, Susanne Kadner, Christoph von Stechow, Gregor Schwerhoff, and Gunnar Luderer. 2014. "Linking Climate Change Mitigation Research to Sustainable Development." In *Handbook of Sustainable Development: Second Edition*. Cheltenham, UK: Edward Elgar Publishing.

Edenhofer, Ottmar, Linus Mattauch, and Jan Siegmeier. 2015. "Hypergeorgism: When Rent Taxation Is Socially Optimal." *FinanzArchiv: Public Finance Analysis* 71 (4): 474–505. doi:10.1628/001522115X14425626525128.

Emran, M Shahe, and Joseph E Stiglitz. 2005. "On Selective Indirect Tax Reform in Developing Countries." *Journal of Public Economics* 89 (4): 599–623.

England, Richard W. 2003. "State and Local Impacts of a Revenue-Neutral Shift from a Uniform Property to a Land Value Tax: Results of a Simulation Study." *Land Economics* 79 (1): 38–43. doi:10.2307/3147103.

Esfahani, Hadi Salehi, and María Teresa Ramírez. 2003. "Institutions, Infrastructure, and Economic Growth." *Journal of Development Economics* 70 (2): 443–477.

Etongo, Daniel, Ida Nadia S Djenontin, Markku Kanninen, Kalame Fobissie, Kaisa Korhonen-Kurki, and Houria Djoudi. 2015. "Land Tenure, Asset Heterogeneity and Deforestation in Southern Burkina Faso." *Forest Policy and Economics* 61: 51–58.

FAO. 2012. *Voluntary Guidelines on the Responsible Governance of Land, Fischeries and Forests in the Context of National Food Security*. Rome.

———. 2014. "The State of Food and Agriculture: Innovation in Family Farming." The State of Food and Agriculture: Rome, Italy: Food and Agriculture Organization of the United Nations (FAO).
———. 2016a. "Global Forest Resources Assessments." *FAO Official Website*. http://www.fao.org/forest-resources-assessment/explore-data/flude/en/.
———. 2016b. "Global Forest Resources Assessments." *Global Forest Resources Assessments Database*. http://www.fao.org/forest-resources-assessment/explore-data/flude/en/.
Feldstein, Martin. 1977. "The Surprising Incidence of a Tax on Pure Rent: A New Answer to an Old Question." *The Journal of Political Economy*, 349–60.
———. 1999. "Tax Avoidance and the Deadweight Loss of the Income Tax." *Review of Economics and Statistics* 81 (4): 674–80.
Fernandez Milan, Blanca, David Kapfer, and Felix Creutzig. 2016. "A Systematic Framework of Location Value Taxes Reveals Dismal Policy Design in Most European Countries." *Land Use Policy* 51 (February): 335–49. doi:10.1016/j.landusepol.2015.11.022.
Fisman, Raymond, and Shang-Jin Wei. 2004. "Tax Rates and Tax Evasion: Evidence from 'missing Imports' in China." *Journal of Political Economy* 112 (2): 471–496.
Follain, James R., and Tamer Emi Miyake. 1986. "Land versus Capital Value Taxation: A General Equilibrium Analysis." *National Tax Journal* 39 (4): 451–70.
Fort, Ricardo. 2007. "Land Inequality and Economic Growth: A Dynamic Panel Data Approach." *Agricultural Economics* 37 (2–3): 159–165.
Fortune of Africa. 2016. "Land Ownership in Rwanda." *Fortune of Africa Rwanda*. Accessed November 15. http://fortuneofafrica.com/rwanda/land-ownership-in-rwanda/.
Friedman, Milton. 1957. "A Theory of the Consumption Function." *NBER Books*.
Fuss, Sabine, Claudine Chen, Michael Jakob, Annika Marxen, Narasimha D. Rao, and Ottmar Edenhofer. 2016. "Could Resource Rents Finance Universal Access to Infrastructure? A First Exploration of Needs and Rents." *Environment and Development Economics* 21 (6): 691–712. doi:10.1017/S1355770X16000139.
Galor, Oded, Omer Moav, and Dietrich Vollrath. 2009. "Inequality in Landownership, the Emergence of Human-Capital Promoting Institutions, and the Great Divergence." *The Review of Economic Studies* 76 (1): 143–79.
Gemmell, Norman, Richard Kneller, and Ismael Sanz. 2013. "Fiscal Decentralization and Economic Growth: Spending versus Revenue Decentralization." *Economic Inquiry* 51 (4): 1915–31.
George, Henry. 1879. *Progress and Poverty: An Enquiry Into the Cause of Industrial Depressions, and of Increase of Want with Increase of Wealth. The Remedy*. K. Paul, Trench & Company.
Global Property Guide. 2016. "Ghana Capital Gains Tax Rates, and Property Income Tax." Text. *Global Property Guide*. January 21. http://www.globalpropertyguide.com%2FAfrica%2FGhana%2FTaxes-and-Costs.
Gordon, Roger, and Wei Li. 2009. "Tax Structures in Developing Countries: Many Puzzles and a Possible Explanation." *Journal of Public Economics* 93 (7): 855–66.
Grote, M., W. McCluskey, and M. McPherson. 2014. "Expanding Tax Capacity to Sustain Development – Taxation of Agriculture, Mining, and Immovable Property." IMF.
GSO. 2011. "General Statistics Office, HCMC, Vietnam." *General Statistics Office, HCMC, Vietnam.*
Hall, Ruth. 2011. "Land Grabbing in Southern Africa: The Many Faces of the Investor Rush." *Review of African Political Economy* 38 (128): 193–214. doi:10.1080/03056244.2011.582753.
Headey, Derek, Mohammad Alauddin, and DS Rao. 2010. "Explaining Agricultural Productivity Growth: An International Perspective." *Agricultural Economics* 41 (1): 1–14.
Henry, Ken, Jeff Harmer, John Piggott, Heather Ridout, and Greg Smith. 2009. "Australia's Future Tax System." *Canberra, Commonwealth Treasury*.
Hunsberger, Carol, Simon Bolwig, Esteve Corbera, and Felix Creutzig. 2014. "Livelihood Impacts of Biofuel Crop Production: Implications for Governance." *Geoforum* 54: 248–60.
Hutton, Eric, Mick Thackray, and Philippe Wingender. 2014. "Uganda. Revenue Administration Gap Analysis Program—The Value-Added Tax Gap." Uganda: IMF, Fiscal Affairs Department.
IMF. 2015. "Current Challenges in Revenue Mobilization: Improving Tax Compliance." Washington, D.C: IMF.

———. 2016. "Regional Economic Outlook Update: Latin America and the Caribbean: Are Chills Here to Stay?" https://www.imf.org/external/pubs/ft/reo/2016/whd/eng/pdf/wreo1016.pdf.

IMF, OECD, UN, and World Bank. 2011. *Supporting the Development of More Effective Tax Systems. A Report to the G-20 Development Working Group*.

International Living. 2016. "Incredible Nicaragua Real Estate and Property." *Internationaliving.com*. about:reader?url=https%3A%2F%2Finternationalliving.com%2Fcountries%2Fnicaragua%2Fnicaragua-real-estate%2F.

International Property Tax Institute. 2016. "Ghana - April 2016." Property Tax and Assesments News from around the World. IPTI Xtracts. http://www.ipti.org/wp-content/uploads/2015/09/IPTI-Xtracts-Ghana-April-20161.pdf.

Irwin, T., L. Fisher, and J. Pigey. 2014. "Fiscal Decentralization: Review of Grants to Local Governments and Local Financial Management." IMF.

Jakob, Michael, Claudine Chen, Sabine Fuss, Annika Marxen, Narasimha Rao, and Ottmar Edenhofer. 2016. "Using Carbon Pricing Revenues to Finance Infrastructure Access."

Jakob, Michael, and Ottmar Edenhofer. 2014. "Green Growth, Degrowth, and the Commons." *Oxford Review of Economic Policy* 30 (3): 447–68.

Javorcik, Beata S, and Gaia Narciso. 2008. "Differentiated Products and Evasion of Import Tariffs." *Journal of International Economics* 76 (2): 208–222.

Johansson, Asa, Christopher Heady, Jens Arnold, Bert Brys, and Laura Vartia. 2008. "Tax and Economic Growth." *OECD Economics Department Working Papers*, no. 620.

Johnson, Justin Andrew, Carlisle Ford Runge, Benjamin Senauer, Jonathan Foley, and Stephen Polasky. 2014. "Global Agriculture and Carbon Trade-Offs." *Proceedings of the National Academy of Sciences* 111 (34): 12342–47. doi:10.1073/pnas.1412835111.

Kalkuhl, Matthias, and Ottmar Edenhofer. 2016. "Ramsey Meets Thünen: The Impact of Land Taxes on Economic Development and Land Conservation." *International Tax and Public Finance*, 1–31.

Kalkuhl, Matthias, and Irfan Mujahid. 2014. "A Typology of Indicators on Production Potential, Efficiency and FNS Risk." LEI Wageningen UR.

Karlan, Dean, Robert Osei, Isaac Osei-Akoto, and Christopher Udry. 2014. "Agricultural Decisions after Relaxing Credit and Risk Constraints." *The Quarterly Journal of Economics* 129 (2): 597–652.

Karras, Georgios. 1997. "On the Optimal Government Size in Europe: Theory and Empirical Evidence." *The Manchester School* 65 (3): 280–94.

Kasanga, R. Kasim, Nii Ashie Kotey, and others. 2001. *Land Management in Ghana: Building on Tradition and Modernity*. International Institute for Environment and Development London. http://pubs.iied.org/pdfs/9002IIED.pdf?pagewanted=all&sa=U&ei=_oVZU538AqTh4wSgtIHwAQ&ved=0CEcQFjAI&usg=AFQjCNHdUllyYPOPQpEDPOLSCQqdhr0I7Q.

Kauffmann, Daniel, and Aart Kraay. 2016. "Worldwide Governance Indicators (WGI)." *The Worldwide Governance Indicators (WGI) Project*. Accessed October 12. http://info.worldbank.org/governance/wgi/#home.

Kelly, Roy. 1993. "Property Tax Reform in Indonesia: Applying A Collection-Led Implementation Strategy*." *Bulletin of Indonesian Economic Studies* 29 (1): 85–104.

———. 2000. "Designing a Property Tax Reform Strategy for Sub-Saharan Africa: An Analytical Framework Applied to Kenya." *Public Budgeting & Finance* 20 (4): 36–51.

Kenny, Lawrence W, and Stanley L Winer. 2006. "Tax Systems in the World: An Empirical Investigation into the Importance of Tax Bases, Administration Costs, Scale and Political Regime." *International Tax and Public Finance* 13 (2–3): 181–215.

Khan, Mahmood Hasan. 2001. "Agricultural Taxation in Developing Countries: A Survey of Issues and Policy." *Agricultural Economics* 24 (3): 315–28.

Knoll, Katharina, Moritz Schularick, and Thomas Steger. 2017. "No Price Like Home: Global House Prices, 1870–2012." *American Economic Review* 107 (2): 331–53.

Koethenbuerger, Marko, and Panu Poutvaara. 2009. "Rent Taxation and Its Intertemporal Welfare Effects in a Small Open Economy." *International Tax and Public Finance* 16 (5): 697–709. doi:10.1007/s10797-008-9085-9.

Kopanyi, M. 2015. "Enhancing Own Revenues of Decentralised Entitites in Rwanda: Policy Challenges and Options in Reforming the Fixed-Asset Tax System." S-38211-RWA-1. London, UK: International Growth Centre.

Lambin, Eric F., and Patrick Meyfroidt. 2011. "Global Land Use Change, Economic Globalization, and the Looming Land Scarcity." *Proceedings of the National Academy of Sciences* 108 (9): 3465–72.

Lambrecht, Isabel. 2016. "'As a Husband I Will Love, Lead, and Provide:' Gendered Access to Land in Ghana." SSRN Scholarly Paper ID 2752635. Rochester, NY: Social Science Research Network. https://papers.ssrn.com/abstract=2752635.

Lamudi. 2016. "A Guide To Real Estate Tax In Ghana...Leading Property Portal Investigates Hidden Costs Of Buying A Home." *ModernGhana.com*. https://www.modernghana.com/lifestyle/7646/a-guide-to-real-estate-tax-in-ghanaleading-property-porta.html.

Larbi, Wordsworth Odame. 2008. "Compulsory Land Acquisition and Compensation in Ghana: Searching for Alternative Policies and Strategies." In *Presentation, FIG/FAO/CNG International Seminar on State and Public Sector Land Management, Verona, Italy*. http://www.fao.org/3/a-i0899t/i0899t02.pdf.

Lawry, Steven, Cyrus Samii, Ruth Hall, Aaron Leopold, Donna Hornby, and Farai Mtero. 2016. "The Impact of Land Property Rights Interventions on Investment and Agricultural Productivity in Developing Countries: A Systematic Review." *Journal of Development Effectiveness*, 1–21.

Lee, Huey-Lin, Thomas W Hertel, Steven Rose, and Misak Avetisyan. 2009. "An Integrated Global Land Use Data Base for CGE Analysis of Climate Policy Options." *Economic Analysis of Land Use in Global Climate Change Policy* 42: 72–88.

Lee, Young, and Roger H Gordon. 2005. "Tax Structure and Economic Growth." *Journal of Public Economics* 89 (5): 1027–43.

Levin, Jörgen, and Lars M Widell. 2014. "Tax Evasion in Kenya and Tanzania: Evidence from Missing Imports." *Economic Modelling* 39: 151–162.

Liu, Antung Anthony. 2013. "Tax Evasion and Optimal Environmental Taxes." *Journal of Environmental Economics and Management* 66 (3): 656–70. doi:10.1016/j.jeem.2013.06.004.

Loayza, Norman, and Jamele Rigolini. 2016. "The Local Impact of Mining on Poverty and Inequality: Evidence from the Commodity Boom in Peru." *World Development* 84 (August): 219–34. doi:10.1016/j.worlddev.2016.03.005.

L'Roe, Jessica, Lisa Rausch, Jacob Munger, and Holly K Gibbs. 2016. "Mapping Properties to Monitor Forests: Landholder Response to a Large Environmental Registration Program in the Brazilian Amazon." *Land Use Policy* 57: 193–203.

Malan, Mandy. 2015. "Agricultural Price Distortions in Africa: Insights into the Determinants of Price Distortions and Their Effect on Land Use Efficiency." http://edepot.wur.nl/365438.

Manaf, Nor Aziah Abdul, John Hasseldine, and Ron Hodges. 2005. "The Determinants of Malaysian Land Taxpayers' Compliance Attitudes." *eJournal of Tax Research* 3 (2): 206–21.

Martinez-Vazquez, Jorge, and Robert M McNab. 2003. "Fiscal Decentralization and Economic Growth." *World Development* 31 (9): 1597–1616.

Mattauch, Linus, Jan Siegmeier, Ottmar Edenhofer, and Felix Creutzig. 2013. "Financing Public Capital through Land Rent Taxation: A Macroeconomic Henry George Theorem." http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2284745.

Matz, Julia Anna, and Gaia Narciso. 2010. "Does Reinforcing Spouses' Land Rights Improve Children's Outcomes? Evidence from a Quasi-Natural Experiment in Rural Vietnam." IIIS.

McCluskey, W. J., M. McCord, P. T. Davis, M. Haran, and D. McIlhatton. 2013. "Prediction Accuracy in Mass Appraisal: A Comparison of Modern Approaches." *Journal of Property Research* 30 (4): 239–65. doi:10.1080/09599916.2013.781204.

McCluskey, William, and Sarabjot Anand. 1999. "The Application of Intelligent Hybrid Techniques for the Mass Appraisal of Residential Properties." *Journal of Property Investment & Finance* 17 (3): 218–39. doi:10.1108/14635789910270495.

McCluskey, William J, and Riël CD Franzsen. 2005. *Land Value Taxation: An Applied Analysis*. Surrey, England: Ashgate Publishing Limited.

McCluskey, William J., and Hong-Loan Trinh. 2013. "Property Tax Reform in Vietnam: Options, Direction and Evaluation." *Land Use Policy* 30 (1): 276–85. doi:10.1016/j.landusepol.2012.03.007.

McDONALD, Scott, and Cecilia Punt. 2004. "Some Welfare Implications of a Land Tax on the Western Cape." *South African Journal of Economics* 72 (4): 808–33. doi:10.1111/j.1813-6982.2004.tb00135.x.

Meghir, Costas, Renata Narita, and Jean-Marc Robin. 2015. "Wages and Informality in Developing Countries." *The American Economic Review* 105 (4): 1509–46.

Menon, Nidhiya, Yana Van Der Meulen Rodgers, and Huong Nguyen. 2014. "Women's Land Rights and Children's Human Capital in Vietnam." *World Development* 54: 18–31.

Merlet, Michel, and Denis Pommier. 2000. *Estudios Sobre Tenencia de La Tierra. Nicaragua*. Managua, Nicaragua: IRAM (Institut de Recherches et d\P.

Mills, E., and R. Hamilton. 1995. "Urban Economics." *Prentice Hall*.

Mills, Edwin S. 1967. "An Aggregative Model of Resource Allocation in a Metropolitan Area." *The American Economic Review* 57 (2): 197–210.

Ministerio de Economía y Finanzas. 2015. "Detalle de Ingresos Por Subgenérica Y Fuentes de Financiamiento." *Detalle de Ingresos Por Subgenérica Y Fuentes de Financiamiento*. https://www.mef.gob.pe/es/component/content/article?id=2896:estadistica-anual-cierre-del-presupuesto-del-sector-...

Ministerio del Ambiente. 2016. "Estrategia Nacional Sobre Bosques Y Cambio Climático." Lima, Peru: Ministerio del Ambiente, Gobierno de Peru.

Mirrlees, James, and Stuart Adam. 2011. *Tax by Design: The Mirrlees Review*. Vol. 2. Oxford University Press. https://books.google.com/books?hl=en&lr=&id=POh3f73miJMC&oi=fnd&pg=PP1&dq=%22all+of+these+reasons,+we+felt+that+the+time+was+ripe+once+again+to+ask%22+%22UK,+we+have+also+tried+to+ensure+that+our+conclusions+are%22+&ots=FnGQHdxLqP&sig=R6LaF00Ap-kFJB3cWRqa2YajUnk.

Mishra, Prachi, Arvind Subramanian, and Petia Topalova. 2008. "Tariffs, Enforcement, and Customs Evasion: Evidence from India." *Journal of Public Economics* 92 (10): 1907–1925.

Moore, Jeffrey C, and Edward J Welniak. 2000. "Income Measurement Error in Surveys: A Review." *Journal of Official Statistics* 16 (4): 331.

Morrissey, Oliver. 2015. "Aid and Government Fiscal Behavior: Assessing Recent Evidence." *World Development* 69: 98–105.

Muth, R. 1968. *Cities and Housing*. Chicago, US: University of Chicago Press.

National Land Agency Indonesia. 2016. "National Land Agency Offical Webpage (Badan Pertanahan Nasional) (BPN)." http://www.bpn.go.id/.

Nepstad, Daniel, David McGrath, Claudia Stickler, Ane Alencar, Andrea Azevedo, Briana Swette, Tathiana Bezerra, Maria DiGiano, João Shimada, and Ronaldo Seroa da Motta. 2014. "Slowing Amazon Deforestation through Public Policy and Interventions in Beef and Soy Supply Chains." *Science* 344 (6188): 1118–23.

Neumann, Kathleen, Peter H Verburg, Elke Stehfest, and Christoph Müller. 2010. "The Yield Gap of Global Grain Production: A Spatial Analysis." *Agricultural Systems* 103 (5): 316–326.

Neumayer, Eric, and Laura Spess. 2005. "Do Bilateral Investment Treaties Increase Foreign Direct Investment to Developing Countries?" *World Development* 33 (10): 1567–85. doi:10.1016/j.worlddev.2005.07.001.

Norregaard, John. 2013. "Taxing Immovable Property Revenue Potential and Implementation Challenges." International Monetary Fund.

Oates, Wallace E, and Robert M Schwab. 2009a. "The Simple Analytics of Land Value Taxation." *Land Value Taxation—theory, Evidence and Practice, Lincolin Institue of Land Policy*, 51–72.

Oates, Wallace E., and Robert M. Schwab. 2009b. "The Simple Analytics of Land Value Taxation." In *Land Value Taxation: Theory, Evidence, and Practice*, 51–72. Cambridge, Mass: Lincoln Institute of Land Policy.

OECD. 2010. *Tax Policy Reform and Economic Growth*. Vol. OECD Tax Policy Studies.

Olson, Mancur. 1965. "The Logic of Collective Action: Public Goods and the Theory of Groups." *Cambridge, Mass*.

Oregon Department of Revenue. 2012. "Appraisal Methods: Basic Information and Procedures for Setting Up a Mass Appraisal Program, 150-303-415 - Appraisal-methods_303-415.pdf." https://www.oregon.gov/DOR/forms/FormsPubs/appraisal-methods_303-415.pdf.

Pachauri, S, A Brew-Hammond, DF Barnes, DH Bouille, S Gitonga, V Modi, G Prasad, A Rath, and H Zerriffi. 2012. "Chapter 19: Energy Access for Development." In *Global Energy Assessment - Toward a Sustainable Future*, 1401 – 1458. Cambridge, UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria: Cambridge University Press.

Persson, Annika, and Mohan Munasinghe. 1995. "Natural Resource Management and Economywide Policies in Costa Rica: A Computable General Equilibrium (CGE) Modeling Approach." *The World Bank Economic Review* 9 (2): 259–85. doi:10.1093/wber/9.2.259.

Pfaff, Alexander SP. 1999. "What Drives Deforestation in the Brazilian Amazon?: Evidence from Satellite and Socioeconomic Data." *Journal of Environmental Economics and Management* 37 (1): 26–43.

PGR. 2016. "Procedimiento de Valuación de Propiedad En Nicaragua." *Procuraduría General de La República*. http://www.pgr.gob.ni/index.php/politicas-propiedad/45-finiquitos-e-indemnizaciones/105-procedimiento-de-valuacie-propiedad-en-nicaragua.

Phuoc, Duc, Pham Hong, Dang Thanh Ha, Nguyen Ngoc Thuy, Le Van Du, Pham Trinh Hung, Maria Victoria O Espaldon, and Annielyn O Magsino. 2016. "Impacts of Changes in Policy and Market Conditions on Land Use, Land Management and Livelihood among Farmers in Central Highlands of Vietnam."

Piketty, Thomas. 2014. *Capital in the Twenty-First Century*. Cambridge, Mass.: Belknap Press of Harvard Univ. Press.

Pinstrup-Andersen, Per, and Satoru Shimokawa. 2006. "Rural Infrastructure and Agricultural Development." *World Bank*.

Plassmann, Florenz, and T. Nicolaus Tideman. 2000. "A Markov Chain Monte Carlo Analysis of the Effect of Two-Rate Property Taxes on Construction." *Journal of Urban Economics* 47 (2): 216–47. doi:10.1006/juec.1999.2140.

Plummer, Elisabeth. 2010. "Evidence on the Distributional Effects of a Land Value Tax on Residential Households." *National Tax Journal* 63 (1): 63–92.

Popkin, Samuel L. 1979. *The Rational Peasant: The Political Economy of Rural Society in Vietnam*. University of California Press.

PwC. 2015. "A Guide to Taxation in Rwanda: 2015 Tax Facts and Figures." Rwanda: PricewaterhouseCoopers. www.pwc.com/rw/en/assets/pdf/taxguide2015-rwanda.pdf.

———. 2016. "Vietnam Pocket Tax Book 2016." Tax Services. Indonesia: PwC Indonesia.

Rao, U.A. Vasanth. 2008. "Is Area-Based Assessment an Alternative, an Intermediate Step, or an Impediment to Value-Based Taxation in India." In *Making the Property Tax Work: Experiences in Developing and Transitional Countries*, Edited by Roy Bahl, Jorge Martinez-Vazquez and Joan Youngman, 241–67. Cambridge, Mass: Lincoln Institute of Land Policy.

Republic of Rwanda. 2016. "Rwanda Natural Resource Authority - About Land and Policies." *Rwanda Natural Resource Authority*. Accessed November 15. http://rnra.rw/index.php?id=17.

Ricardo, David. 1817. "On Foreign Trade." *Principles of Political Economy and Taxation*.

Richter, Wolfram F, and Robin W Boadway. 2005. "Trading off Tax Distortion and Tax Evasion." *Journal of Public Economic Theory* 7 (3): 361–81.

Robinson, Brian E, Margaret B Holland, and Lisa Naughton-Treves. 2014. "Does Secure Land Tenure Save Forests? A Meta-Analysis of the Relationship between Land Tenure and Tropical Deforestation." *Global Environmental Change* 29: 281–93.

Rojas, Julio Escalante. 2015. "¿Cómo Se Fija El Impuesto Predial Que Cobran Los Municipios?" *El Comercio*. July 11. http://elcomercio.pe/economia/personal/como-se-fija-impuesto-predial-que-cobran-municipios-noticia-1825116.

Rulli, Maria Cristina, Antonio Saviori, and Paolo D'Odorico. 2013. "Global Land and Water Grabbing." *Proceedings of the National Academy of Sciences* 110 (3): 892–97. doi:10.1073/pnas.1213163110.

Rwanda Revenue Authority. 2016. "Site Officiel de L' Office Rwandais Des Recettes." *Rwanda Revenue Authority, Tax Services*. http://www.rra.gov.rw/fr/spip.php?article180.

Schlegelmilch, Kai, Stefan Speck, and Pendo Maro. 2010. "Fiscal Reform in EC Development Cooperation."

SCNP. 2010. "Report on the Project of Law on Non-Agricultural Land Use Tax. Text No 316/BC-UBTVQH12." Vietnam: Vietnam Standing Committee of National Parliament.

Scott, James C. 1977. *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*. Yale University Press. https://books.google.de/books?hl=de&lr=&id=qu5KUdN_rDkC&oi=fnd&pg=PP5&dq=the+moral+economy+of+peasants&ots=k6lB7t0N1_&sig=hAQgLFltbYQT0lbePwAZZboYZP4.

Segal, Paul. 2011. "Resource Rents, Redistribution, and Halving Global Poverty: The Resource Dividend." *World Development* 39 (4): 475–89. doi:10.1016/j.worlddev.2010.08.013.

Skinner, Jonathan. 1991. "Prospects for Agricultural Land Taxation in Developing Countries." *The World Bank Economic Review* 5 (3): 493–511.

Slemrod, Joel, and Shlomo Yitzhaki. 2002. "Tax Avoidance, Evasion, and Administration." *Handbook of Public Economics* 3: 1423–70.

Slesnick, Daniel T. 1993. "Gaining Ground: Poverty in the Postwar United States." *Journal of Political Economy* 101 (1): 1–38.

Smith, Adam. 1776. "The Wealth of Nations, Book 1." *London, Methuen & Co*.

Smith, Pete, Peter J. Gregory, Detlef Van Vuuren, Michael Obersteiner, Petr Havlík, Mark Rounsevell, Jeremy Woods, Elke Stehfest, and Jessica Bellarby. 2010. "Competition for Land." *Philosophical Transactions of the Royal Society B: Biological Sciences* 365 (1554): 2941–57.

Song, Yan, and Yves Zenou. 2006. "Property Tax and Urban Sprawl: Theory and Implications for US Cities." *Journal of Urban Economics* 60 (3): 519–534. doi:10.1016/j.jue.2006.05.001.

State of the Republic of Indonesia. 1960. *Act N° 5 of 1960 Concerning Basic Regulations on Agrarian Principles. UU5-1960-Eng*. https://okusiassociates.com/garydean/works/UU_NO_5_1960_UUPA_en.pdf.

Stiglitz, Joseph E. 2015. "The Origins of Inequality, and Policies to Contain It." *National Tax Journal* 68 (2): 425–48. doi:10.17310/ntj.2015.2.09.

Strasma, John, James Alm, Eric Shearer, and Alfred Waldstein. 1987. "The Impact of Agricultural Land Revenue Systems on Agricultural Land Usage in Developing Countries." *Associates in Rural Development, Burlington, VT*.

Thornton, John. 2007. "Fiscal Decentralization and Economic Growth Reconsidered." *Journal of Urban Economics* 61 (1): 64–70.

Ulyssea, Gabriel. 2010. "Regulation of Entry, Labor Market Institutions and the Informal Sector." *Journal of Development Economics* 91 (1): 87–99.

UNECA. 2016. "Investment Policies and Bilateral Investment Treaties in Africa: Implications for Regional Integration." Addis Ababa, Ethiopia: UN Economic Commission for Africa.

United Cities and Local Governments (UCLG). 2008. *Decentralization and Local Democracy in the World: First Global Report by United Cities and Local Governments 2008*. Washington, D.C: World Bank Publications.

United Nations. 2015. *Addis Ababa Action Agenda of the Third International Conference on Financing for Development*. New York, NY: United Nations. http://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf.

US AID. 2011. "EGAT/EG, Public Financial Management Project - Rwanda." Washington, US: United States Agency of International Development. pdf.usaid.gov/pdf_docs/PA00JD7X.pdf.

VanDeveer, Stacy D, and Geoffrey D Dabelko. 2001. "It's Capacity, Stupid: International Assistance and National Implementation." *Global Environmental Politics* 1 (2): 18–29.

VNP. 2010. *Law on Non-Agricultural Land Use Tax. 48/2010/QH12*. Vol. 48/2010/QH12.

Von Haldenwang, Christian. 2015. "The Political Cost of Local Revenue Mobilisation: Decentralisation of the Property Tax in Indonesia." *Available at SSRN 2579598*.

Wessel, Robert H. 1967. "A Note on Economic Rent." *The American Economic Review* 57 (5): 1221–1226.

World Bank. 2003. "Property Taxes in Nicaragua." In *Public Sector: Decentralization*. Washington, D.C. http://webcache.googleusercontent.com/search?q=cache:8AqtNMlHeiUJ:www1.worldbank.org/publicsector/decentralization/June2003Seminar/Nicaragua.pdf+&cd=1&hl=de&ct=clnk&gl=us&client=firefox-b-ab.

———. 2011a. "The Changing Wealth of Nations." Washington, DC: World Bank.

———. 2011b. "The Changing Wealth of Nations Database." *The Changing Wealth of Nations*. http://data.worldbank.org/data-catalog/wealth-of-nations.

———. 2016a. "World Development Indicators | Data." *World Development Indicators*. http://data.worldbank.org/data-catalog/world-development-indicators.

———. 2016b. "Worldwide Governance Indicators (WGI) Project - Official Webpage." http://info.worldbank.org/governance/wgi/#home.

World Bank Group. 2015. "Registering Property - Doing Business." *Doing Business*. http://www.doingbusiness.org/data/exploretopics/registering-property.

———. 2016. "Methodology for Registering Property - Doing Business - World Bank Group." *Doing Business: Measuring Business Regulations*. http://www.doingbusiness.org/methodology/registering-property.

Yepes, Tito, Justin R Pierce, and Vivien Foster. 2009. "Making Sense of Africa's Infrastructure Endowment: A Benchmarking Approach." *World Bank Policy Research Working Paper Series* 4912.

Yusuf, Hamid. 2011. "Land Administration System in Indonesia." In *"Together for Better Future Development."* Siem Reap, Cambodia.

Zhang, Tao, and Heng-fu Zou. 1998. "Fiscal Decentralization, Public Spending, and Economic Growth in China." *Journal of Public Economics* 67 (2): 221–40.

7. Appendix

7.1. Countries with Land Taxation Experience

Table 6 Countries with Land Taxation Experience

Tax base		Assessment method
North America		
Canada	Land; property tax	Market value
United States	Land; property tax	Market value
Europe & Central Asia		
Austria	Vacant land; property tax	Cadastral value
Denmark	Land; property tax	Market value
Estonia	Land	Cadastral value
Finland	Land; property tax	-
France	Land; property tax	-
Hungary	Unimproved land; property tax	Area based; market value - self assessment
Italy	Vacant land; property tax	Market value - rent
Latvia	Land; property tax	Market value
Lithuania	Land; property tax	Cadastral value
Romania	Land; property tax	Area based
Russia	Land; property tax	Area based
Slovakia	Land; property tax	Cadastral value
Slovenia	Land; property tax	Area based
Ukraine	Land; property tax	Area based - self assessment
Latin America and the Caribbean		
Argentina	Agricultural land; property tax	Cadastral value
Barbados	Land; -	-
Belize	Land; -	-
Chile	Agricultural land; property tax	Cadastral value
Colombia	Agricultural land; property tax	Cadastral value - self assessment
Grenada	Land; -	-
Jamaica	Land; -	Cadastral value
Mexico	Land; property tax	Market value
Mexico	Land; property tax	Market value
Montserrat	Land; -	-
Uruguay	Agricultural land; property tax	Cadastral value
South East Asia and the Pacific		
Australia	Land; property tax	Market value; rental value; combination
Bangladesh	Agricultural land; property tax	Area based
China	Occupied land; property tax	Area based; market value; rental value
Ethiopia	Agricultural land; property tax	Area based - land use fee
Fiji	Land; -	-
India	Agricultural land; property tax	Rental value; area based; market value
Indonesia	Agricultural land; property tax	Market value
Japan	Land; property tax (including tangible business assets)	Market value
Malaysia	Agricultural land; property tax	Area based
New Zealand	Land; property tax	Market value
Pakistan	Agricultural land; property tax	Area based

	Tax base	Assessment method
Papua New Guinea	Land; -	-
Philippines	Agricultural land; property tax	Market value - self assessment
Solomon Islands	Land; -	-
South Korea	Land; -	-
Sri Lanka	Agricultural land; property tax	Area based
Taiwan	Land; -	Self assessment
Thailand	Land; property tax	Market value - rent - self assessment
Middle East & Africa		
Egypt	Agricultural land; property tax	Area based
Kenya	Land; property tax (including tangible business assets)	Area based; market value; or combination
Malawi	Land; -	-
Namibia	Land; -	-
South Africa	Land; property tax	Market value
Swaziland	Land; -	-
Tanzania	Land; -	-
Tunisia	Unimproved land; property tax	Area based - rent
Zambia	Land; -	-
Zimbabwe	Land; -	-

Note: based on (Dye and England 2010; Richard Miller Bird and Slack 2004; William J McCluskey and Franzsen 2005; Fernandez Milan, Kapfer, and Creutzig 2016; Khan 2001). Countries have only a land-based tax ("Land"); others have a complementary property tax ("property tax"), or there is no available information whether additional taxes on property exist ("land; -").

7.2. Equilibrium models on land taxes

Table 7 Overview on model calculations on land tax reforms

Country/ Region	Urban vs. Rural	Efficiency	Distribution	Land Use	Budget Balancing (BB)	Tax Design	Source
Australia	Both (not differentiated)	Neutral (by design), but neg. MCF due to openness of economy	(-) land owners bare the tax (-) foreign land owners vs. (+) domestic households	Fixed (by design)	Lump-sum transfer to households	Tax on unimproved value of land	(Cao et al. 2015)
Western Cape, South Africa	Both (rural and urban household groups)	Small effect, depends on BB (+) if BB by reduction in sales tax	Depends on BB, mostly: (--) white rural HH (-) or (+-) black rural HH (+) urban HH	Fixed (by design)	Various – most positive scenario: by decreasing sales tax	Tax on rural land value	(McDONALD and Punt 2004)
Costa Rica	Both (not differentiated)	Neutral ("green" GDP decreases by negligible amount)	(-) consumer utility (small effect)	Decrease (decrease in deforestation)		Increase in land tax, incomplete markets (property rights undefined and hence social costs of deforestation not internalized)	(Persson and Munasinghe 1995)
Atlanta, Georgia (USA)	Urban	Increase	(+) all income groups, lower income groups benefit more → progressive tax shift	Decrease (urban area and business district shrink, pop. density increased)	Lump-sum transfer to all individuals, or acc. to endowment structure for model with diff. income groups	Switch from property value tax to land value tax	(Choi and Sjoquist 2015)

Country/ Region	Urban vs. Rural	Efficiency	Distribution	Land Use	Budget Balancing (BB)	Tax Design	Source
Boston, USA	Urban	Increase				Switch from property value tax to split-rate property and land value tax	(DiMasi 1987)
New Hampshire, USA	Both (not differentiated)	Increase ((+) GDP, (+) employment, (+) construction)	(-) owners of residential and current use land (part of it levied to foreign land owners) (+) owners of commercial, industrial and utility properties (+) some regions profit more than others (also outside of NH) (+) labor (real wages increase)	-	Revenue-neutral	Revenue-neutral shift from property tax to land value tax	(England 2003)
Jamaica		LVT: increase CVT: modest increase to substantial decrease		Fixed (by design)	Lump-sum transfer to consumers	(i) Land value tax (LVT) and (ii) capital value tax (CVT)	(Follain and Miyake 1986)
Boston, USA	Urban	Increase				Switch from discriminatory to non-discriminatory property value tax	(DiMasi 1988)

Note. Underlying models are CGE models that simulate a change in land tax regimes with respect to efficiency, distribution and land use.

7.3. Costs of cadasters and land registries

Table 8. Major World Bank financed projects on creation and maintenance of land registries or cadasters.

Country	Cost	Creation of system vs. maintenance	Project title	Source
Algeria	US$ 96.00 million	Creation	Cadastre Project	http://projects.worldbank.org/P004964/cadastre-project?lang=en
Armenia	US$ 10.60 million	Creation	Title Registration Project	http://projects.worldbank.org/P057560/title-registration-project?lang=en&tab=overview
Bolivia	US$ 20.40 million	Maintenance (improving the land administration system within the current framework)	National Land Administration Project	http://projects.worldbank.org/P006197/national-land-administration-project?lang=en
Bosnia and Herzegovina	US$ 34.10 million	Creation	Real Estate Registration Project	http://projects.worldbank.org/P128950/real-estate-registration-project?lang=en
Brazil	US$ 3.50 million	Maintenance (obtaining up-to-date environmental cadastral data containing information about owners and their properties)	Brazil Rural Environmental Cadastre Technical Assistance Project	http://projects.worldbank.org/P120523/brazil-rural-environmental-cadastre-technical-assistance-project?lang=en
El Salvador	US$ 55.80 million	Maintenance (improve the execution of day-to-day registry and cadastre services at local level)	Land Administration	http://projects.worldbank.org/P086953/land-administration-ii?lang=en
Ghana	US$ 55.05 million	Creation	Land Administration Project	http://projects.worldbank.org/P071157/land-administration-project?lang=en
Guatemala	US$ 64.30 million	Creation	Second Land Administration Project	http://projects.worldbank.org/P087106/land-administration-ii-apl?lang=en
Honduras	US$ 32.80 million	Maintenance (cadastral surveying and land regularization)	Second Land Administration Project	http://projects.worldbank.org/P106680/land-administration-program?lang=en
Indonesia	US$ 140.10 million	Maintenance (long-term development of the Land National Agency's institutional capacity for land administration)	Land Administration Project	http://projects.worldbank.org/P003984/land-administration-project?lang=en
Kosovo	US$ 13.86 million	Maintenance (improving the capacity of Municipal Cadastre Offices to deliver services)	Real Estate Cadastre and Registration	http://projects.worldbank.org/P101214/real-estate-cadastre-registration?lang=en

Country	Cost	Creation of system vs. maintenance	Project title	Source
Kyrgyzstan	US$ 7.50 million	Maintenance (digitalizing cadastral plans, etc.)	Second Land and Real Estate Registration Project	http://projects.worldbank.org/P108178/second-land-real-estate-registration-project?lang=en
Laos	US$ 28.40 million	Creation	Land Titling Project	http://projects.worldbank.org/P004208/land-titling-project?lang=en
Macedonia	US$ 12.10 million	Maintenance (digitalizing the existing cadastre maps and plans, etc.)	Real Estate Cadastre and Registration Project	http://projects.worldbank.org/P119688/af-real-estate-cadastre-registration-project?lang=en
Nicaragua	US$ 40.00 million	Maintenance (improved regularization, titling, and registry services)	Second Land Administration Project	http://projects.worldbank.org/P121152/second-land-administration-project-support-nicaragua-land-program-prodep?lang=en&tab=overview
Paraguay	US$ 41.10 million	Creation (rural cadastre)	Land Use Rationalization Project	http://projects.worldbank.org/P007911/land-use-rationalization-project?lang=en
Philippines	US$ 10.35 million	Creation (only in certain municipalities)	Land Administration and Management Project	http://projects.worldbank.org/P066069/land-administration-management-project?lang=en
Russia	US$ 101.50 million	Maintenance (on-going reforms of the registration system of rights in immovable property)	Registration Project	http://projects.worldbank.org/P093050/registration-project?lang=en
Tajikistan	US$ 10.07 million	Maintenance (further development of the cadastral system)	Land Registration & Cadastre System for Sustainable Agriculture Project	http://projects.worldbank.org/P129313/af-land-registration-cadastre-system-sustainable-agriculture-project?lang=en
Thailand	US$ 206.80 million	Maintenance (improving land administration service delivery)	Land Titling Project	http://projects.worldbank.org/P004803/land-titling-project-03?lang=en
Turkey	US$ 129.59 million	Maintenance (scaling up cadastre renovation)	Land Registration and Cadastre Modernization Project	http://projects.worldbank.org/P154259?lang=en
Uzbekistan	US$ 25.00 million	Creation	Modernization of Real Property Registration and Cadastre	http://projects.worldbank.org/P151746?lang=en
Vietnam	US$ 180.00 million	Maintenance (development and implementation of the national Multipurpose Land Information System)	Project for Improved Land Governance and Databases	http://projects.worldbank.org/P154387?lang=en

7.4. Detailed description of indicators used in the typology

Indicator 1: Land–sparing (extensification). Although land sparing could refer to many land use practices (i.e. biodiversity loss, desertification, urban sprawl etc.) we focus on deforestation because of data availability and data quality. Deforestation is expressed as the percentage of forest area that has been lost between the years 2005 and 2015, based on FAO data (FAO 2016b).

Indicator 2: Land use efficiency (intensification): Data on land use efficiencies is highly contested; depending on normative assumption of what is the best land use, and how and in which conditions is the highest potential determined countries may have different highest potential use of their land. For agricultural land, cereal yields for each economy expressed as area-weighted average cereal yields in Mcal/ha per country (average for 2010-2014) are a proxy indicator for land use efficiency. Yields depend also on climatic and soil conditions but also on investments, infrastructure, institutions and technology (Neumann et al. 2010) which leads to ongoing debates on appropriate reference points for calculating yield gaps.

Indicator 3: Land rents Data on land values is hardly existent. The Changing Wealth of Nations Project (World Bank 2011b) offers country-comparable data on economic welfare with most economies included. Out of the reported values for nature capital[60], we select the values reported for crop (rents from cultivating crops), pasture (rent from selling livestock products) and timber forests (rents from round wood and fuel wood production). We exclude non-timber forests because they do not produce rents, as they are not exploited. World Bank calculates the land rents as the revenues from cultivating the land (based on crop prices and yields) net of cultivation costs. The rent flows are summed over a 25-year time horizon with a discount rate of 4 percent to calculate the land wealth which is finally reported. In order to calculate rents, we multiply the wealth figure provided by the World Bank (2011) with the discount rate of 4 percent used by the World Bank. The base year for calculating the rents is 2005. Current rents could be higher in case agricultural land expanded and crop prices increased in excess of production costs (the deflated FAO Cereals Price Index increased by 33 percent between 2005 and 2015 while real fertilizer prices (World Bank GEM Database) increased in the same time by 36 percent). Although urban land rents have an increasing role in the world economy due to urbanization trends, no consistent and comprehensive data exists in this regards. Cross-checking the agricultural land rent values with figures from the SAGE database gives a rather consistent figure.

Indicator 4: Financial demands for access to basic infrastructure expresses the required infrastructure costs (as a percentage of 2010 GDP) that would enable universal access (100 percent) for the respective countries' populations to five types of infrastructure which are agreed to be essential in the development process by 2030: water, sanitation, electricity, roads, and information and communication technology (ICT). The World Bank defines access to improved drinking water sources as the provision of piped water on premises (piped household water connection located inside the user's dwelling, plot or yard), and as other improved drinking water sources (public taps or stand-pipes, tube wells or boreholes, protected dug wells, protected springs and rainwater collection). In the case of sanitation, access refers to the availability for use of flush/pour flush (to piped sewer systems, septic tanks or pit latrines), ventilated improved pit latrine, pit latrine with slab, and composting toilet facilities. Access to electricity is defined as the percentage of households with an electricity connection (Pachauri et al. 2012). For telecommunications, the model assumes that access is enabled by the access to a mobile phone and 10 minutes of airtime per day (ITU, 2014). For transportation, the model does not determine the population shares having access to roads, due to lack of data, but takes the length of unpaved roads as a

[60] Natural capital is sum of Crop, Pasture Land, Timber, Non Timber Forest, Protected Areas, Oil, Natural Gas, Coal, and Minerals.

proxy for the demand for (paved) roads (World Bank, 2014). First, the amount of people without access to infrastructure in 2030 is estimated based on current access gaps and the UN population forecast for 2030. Then costs for infrastructure expansion to close gaps are used from the literature, if available on country base, otherwise regional averages are used (for additional information, see (Jakob et al. 2016)).

Indicator 5: Sum of trade distortions (as a percentage of GDP) provides an indication of the role of distortionary taxes in the economy. It is calculated as the sum of customs and other import duties and taxes on exports. Data is from the World Development Indicators database (World Bank 2016a).

Indicator 6: Shares of agricultural holdings for land size area between 0 and 2 ha (as a percentage of total land) (FAO 2014) provide insightful information on how land is distributed among the rural population, and hence, the equity effects of a land tax. In principle, small holders (0-2 ha) would be highly affected by a land tax compared to larger holders because of their low incomes. Thus, the higher the share of small holders in the country, the more adverse a land tax may be for poor households.

Indicator 7: Quality of land administration index. This index is part of the Doing Business Project, an initiative that provides objective measures of business regulations and their enforcement across 189 economies and selected cities at the subnational and regional level (World Bank Group 2016). The quality of land administration index is measured as the sum of the scores on four other indices: the reliability of infrastructure, transparency of information, geographic coverage and land dispute resolution indices (World Bank Group 2016). The most recent round of data collection for the project was completed in June 2015. Data ranges from 0 to 30, however we normalize the index to values between 0 and 1, with higher values indicating better quality of the land administration system.

Indicator 8: Control of corruption Index. This index is part of the Worldwide Governance Indicators (WGI) project (World Bank 2016b); it reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests (Kauffmann and Kraay 2016). The indicator is reported in two ways: (1) in their standard normal units, ranging from approximately -2.5 to 2.5, with higher values corresponding to better outcomes. We normalize these values to the range of 0-1.

Table 6 describes all indicators, their data source, time scale and units. The sample size is 83 countries; it includes all middle and income countries where data for all indicators above mentioned is available.

Table 9 Description of variables and indicators used for the typology (MRY – Most recent year)

	Variable	Data Source	Year	Units
1	Land sparing	Deforestation: FAO 2016: FAO, Global Forest Resources Assessments (FAO 2016b)	2005-2015	Change forest area (% of land area)
2	Cereal yields	FAOSTAT	2010-2014	Area-weighted average cereal yields in Mcal/ha per country (average for 2010-2014).
3	Agricultural rents	The Changing Wealth of Nations (World Bank 2011b)	2005	Agricultural land rents (% GDP)
4	Financing needs	Data on financing needs for development infrastructure (water, electricity, sanitation, ICT and roads provided by (Jakob et al. 2016).	2010	Total financial needs for infrastructure (% GDP)
5	Existing tax distortions	World Development Indicators (World Bank 2016a).	MRY	Sum of customs and other import duties and taxes on exports (% GDP)
6	Distributional effects	FAO 2014: The State of Food and Agriculture Innovation in family farming (FAO 2014)	2014	Shares of agricultural holdings (%) for land size area between 0 and 2 ha.
7	Quality of Land Administration Index	Registering Property – Doing Business Report 2015-2016 (World Bank Group 2015)	2015	Quality of the land administration index (estimate, normalized between values 0-1)
8	Control of Corruption Index	Worldwide Governance Indicators (WGI) (Kauffmann and Kraay 2016; World Bank 2016b)	2015	Control of Corruption (estimate, normalized between values 0-1)

7.5. Results of the Pareto ordering

Figure 9a. Typology results - Pareto frontiers for the different indicators: (a) Quality of Land Administration index and (b) Control of Corruption Index vs. deforestation (1, 2), yield production (3, 4) and agricultural land rents (5, 6).

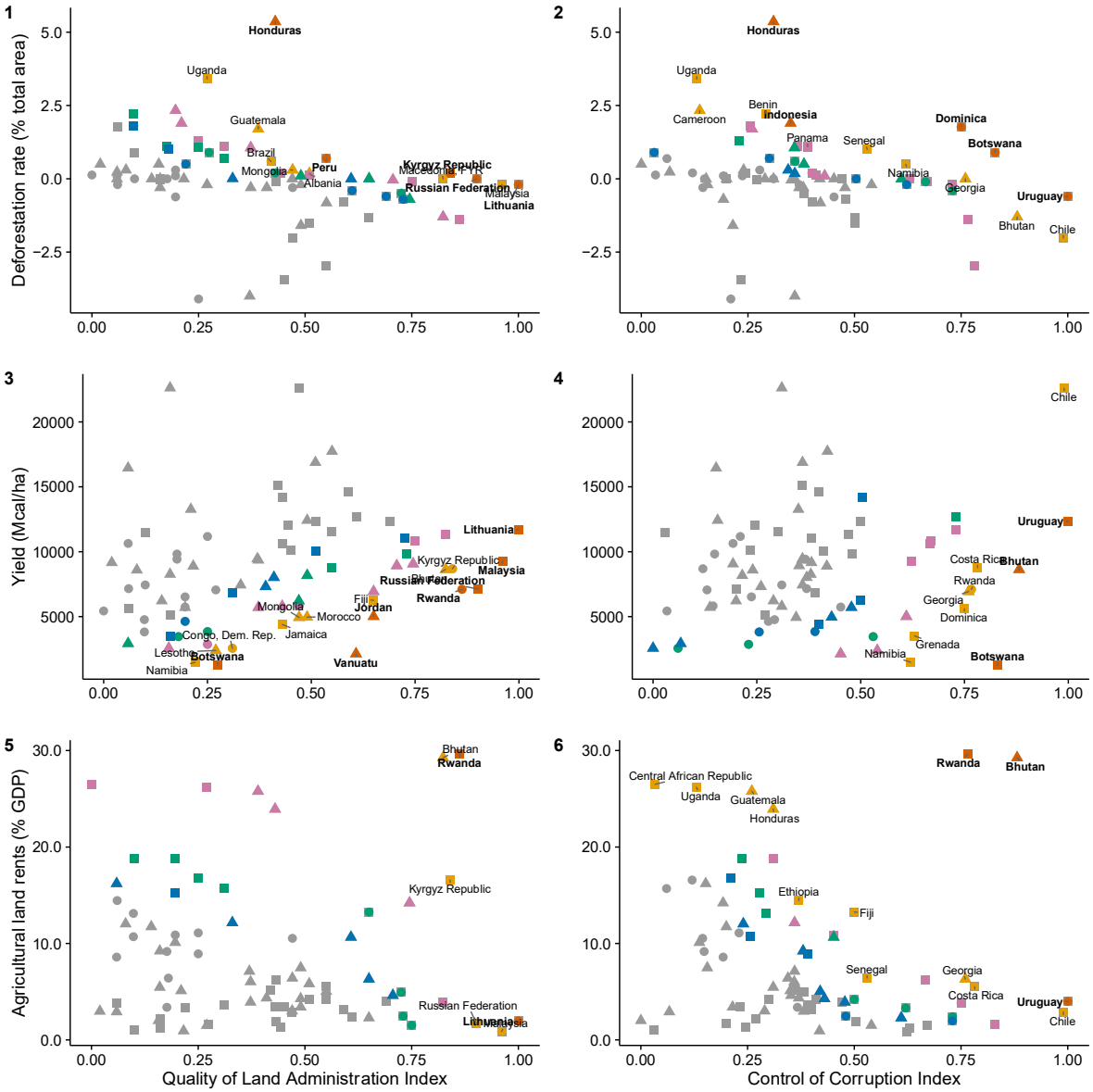
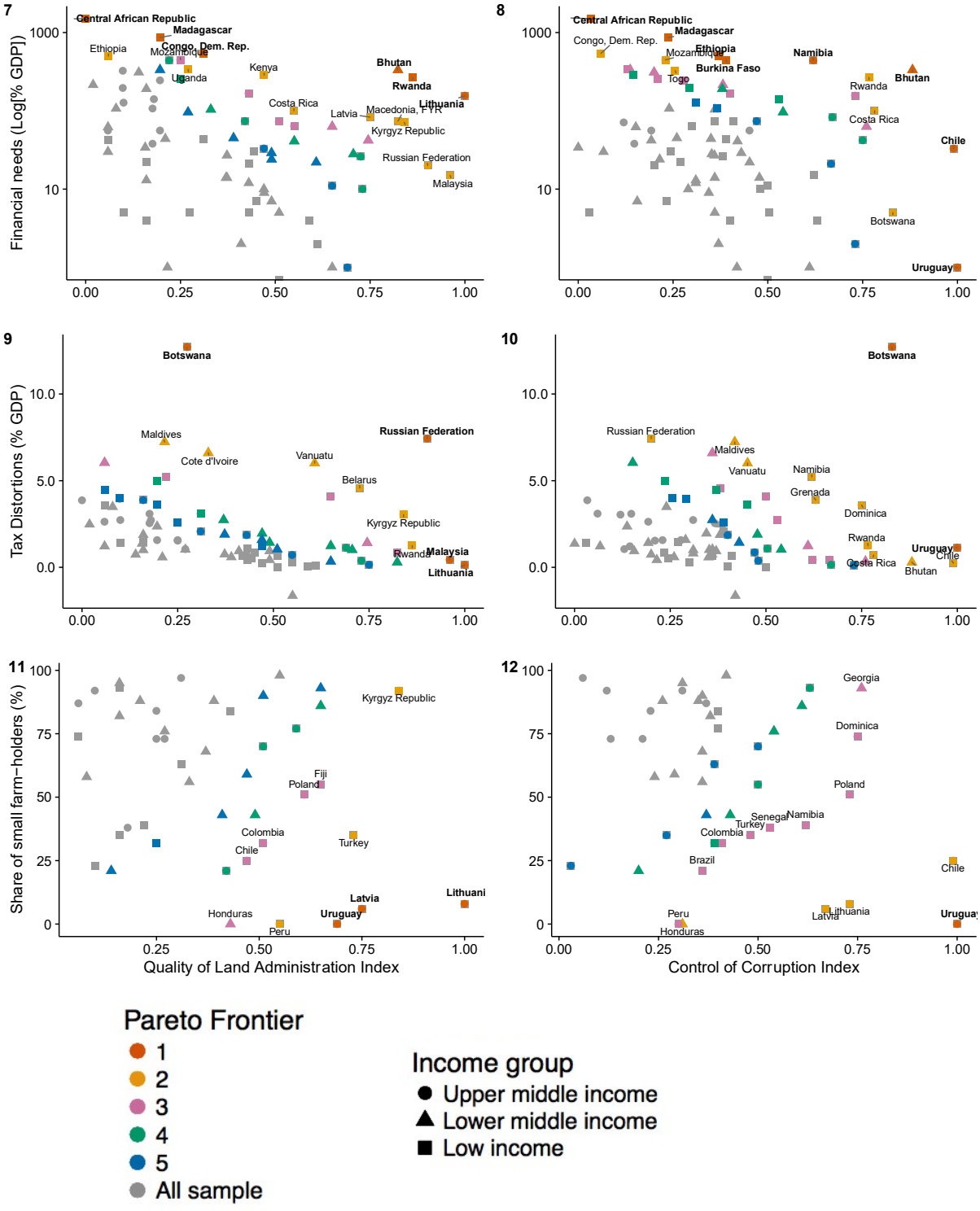


Figure 9b. Typology results - Pareto frontiers for the different indicators: (a) Quality of Land Administration index and (b) Control of Corruption Index vs. financial needs (7, 8), yield gap (9, 10), and share of small farm holders (11, 12).



List of Pareto performance (all indicators) for each world region, including only countries which lie on the first three Pareto frontiers. Additionally, the countries are indicated (bold) where household data with information on land ownership, land size, land value and income is available with survey years since 2005 and underlined font indicates selected countries for case studies.

Table 10 Pareto performance for each world region (descending order).

Latin America & Caribbean	Sub-Saharan Africa	South East Asia and the Pacific	Europe & Central Asia	Middle East & North Africa
Costa Rica	**Rwanda**	Bhutan	Georgia	Jordan
Jamaica	Burkina Faso	Fiji	Lithuania	Morocco
Uruguay	Namibia	Malaysia	Latvia	Tunisia
Chile	Botswana	Vanuatu	Macedonia,	Iran
Dominica	Benin	Lao PDR	Turkey	Algeria
Honduras	Congo, Dem. Rep.	Mongolia	Armenia	
Colombia	Senegal	**Indonesia**	Belarus	
Grenada	Togo	**Nepal**	Kyrgyz Republic	
Guatemala	Cameroon	**Vietnam**	Moldova	
Brazil	Central African Rep.	Papua New Guinea	Poland	
El Salvador	Cote d'Ivoire	Bangladesh	**Russian Federation**	
Panama	Ethiopia	China	Albania	
Peru	Kenya	**India**	Azerbaijan	
Dominican Republic	Madagascar	Maldives	Romania	
Mexico	Mozambique	Philippines		
Nicaragua	**Uganda**	Sri Lanka		
Venezuela, RB	Lesotho	Pakistan		
	Mauritius	Thailand		
	Ghana			
	Angola			
	Mali			
	South Africa			
	Zambia			
	Congo, Rep.			

7.6. Tax systems in case study countries

Table 11. Taxation systems in selected countries: Rwanda, Ghana, Peru.

	Rwanda	Ghana	Peru
Property tax	Levied on registered land and buildings/houses whether in use or not, according to rates determined by the districts. The tax varies from district to district.	Real Property Levy: usage of property. Taxes rates range between The rates range from 0.5% to 3% (although in Accra rates are much higher)	Levied on the value of urban and rural real estate property. Progressive cumulative scale: 0-15 TU: 0.2% 15-60 TU: 0.6% >60 TU: 1%
Transfer Taxes	Yes	No	Levied on all transfers of urban and rural real estate property. The taxpayer is the purchaser of the property. Taxable base: transaction value. Tax rate is 3%
Stamp Tax	NA	Conveyance or sale: Applicable rate ranging from 0.25% to 1%. Leases: rates range from 0.5% to 1% of the consideration (also dependent on the lease period).	NA
Income Tax	0-30,000 RWF: 0% 30,001-100,000 RWF: 20% >100,001 RWF: 30%	0-2592 GH: 0% Next 1296 GH: 5% Next 1812: 10% Next 28180: 17.5% Exceeding 38880: 25% Non-residents: 20%	0-5 TU: 8% 5-20 TU: 14% 20-35 TU: 17% 35-45 TU: 20% > 45 TU: 30%
Capital gains	NA	When gain exceeds GH¢50: 15% (land, buildings, business assets including goodwill and shares of a resident company)	0,05
Social Security Contributions (as % gross salary)	Employer: 5%; employee: 3%	5.5%-13% gross salaries	Health: 9%; Pension funds: 13%
Standard VAT rate (%)	18%	15%; In addition, a National Health Insurance Levy of 2.5% is imposed on the supply of goods and services in Ghana and the importation of goods and supply of imported services.	18%
Inheritance, estate, and gift taxes	NA	NA	NA

	Rwanda	Ghana	Peru
Luxury and excise taxes	Locally manufactured goods and imported equivalents. 150% is levied on cigarettes; 60% on beer; 70% on brandies, liquors, and whisky; and 8% on telephone communication. There is also excise duty on motor vehicles ranging between 5% and 15%.	NA	Fuel, cigarettes, beer, liquor, and vehicles, is subject to excise tax.
Corporate income tax rate (%)	30	25% (standard rate; many exceptions)	28
Withholding tax rates (%) (Dividends / Interest / Royalties)	Resident: 15 / 15 / 15; Non-resident: 15 / 15 / 15		Resident: NA; Non-resident: 6.8 / 4.99 / 30

Table 12. Taxation systems in selected countries: Nicaragua, Indonesia, Vietnam

	Nicaragua	Indonesia	Vietnam
Property tax	The tax rate is 1% of the taxable value, but since taxable value is set at 80% of the cadastral value (or, as the case may be, self-declared value), the rate is really 0.8%. Exemptions: Residential properties less than 10,000 colones (in general) or 40,000 colones (in Managua) are exempt. In rural areas, this exemption may include up to 1 hectare of land. There are further exemptions	Land and buildings tax (PBB): due annually at maximum 0.3% of the regional government-determined market value.	The municipal authorities levy a tax on real estate. A combination of land use charges and registration fees, land use right transfers and sales of state-owned houses, and land rent taxes on agricultural and housing land.
Transfer Taxes	Property transfers are subject to a 1%-3% pre-payment income tax on the purchase price. While most sellers ask the buyer to pay it, you should be aware that it is a pre-payment of income tax; therefore, it is legally payable by the seller.	Land and Building Transfer Duty: The land and building transfer duty is levied at a flat rate of 5%, and is charged to the seller. The tax base is the transfer value of the property. There is a non-taxable amount which varies per region.	Transfer of land use rights and gifts/winnings or prizes (excluding casino winnings) also are taxable
Stamp Tax	1% property value, with a maximum amount of US$1,370	Stamp duty on land and building transfer (BPHTB): at 5% of the greater of the transaction value or the regional government-determined market value.	A stamp duty at rates of 0.5% to 2% applies on the transfer of property.
Income Tax	For resident individuals, income tax (IR) is calculated on a progressive tax rate, up to a maximum of 30%. For non-residents, any income originating from within Nicaragua is taxed at a flat 15%.	0-50 million: 5% 50-200 million: 15% 200-250 million: 25% > 500 million:30%	Progressive rates ranging from 5% to 35% apply to residents, while nonresidents are subject to a flat rate of 20%.
Capital gains	Capital gains on property are treated as ordinary taxable income. Liable for tax on such earnings, up to a maximum of 35.5%, although a typical rate is around 10%.	see Transfer taxes	Capital gains derived from a capital assignment are subject to a 20% tax on gains.
Social Security Contributions (as % gross salary)	6.25% gross salary	Employer: 11.5%; employee: 4%	Vietnamese employees are required to make SI, HI and UI contributions at rates of 8%, 1.5% and 1% of the employee's salary, respectively. Foreign employees are subject only to HI.
Standard VAT rate (%)	15%	10%	Rates are 0%, 5% and 10%
Inheritance, estate, and gift taxes	A charge of 4% is levied on the gift or inheritance of property	NA	In excess of VND10 million at 10%
Luxury and excise taxes	NA	Luxury-goods sales tax (LGST) - rates currently ranging from 10% to 125% depending on good (for example luxury cars, apartments and houses)	NA

	Nicaragua	Indonesia	Vietnam
Corporate income tax rate (%)	The standard corporate rate is 30%. Small and medium-sized enterprises are subject to a tax of 1% on income in excess of NIO 40 million.	25	The standard corporate rate is 20%. The rate for enterprises operating in the oil and gas and natural resource sectors ranges from 32% to 50%, depending on the project.
Withholding tax rates (%) (Dividends / Interest / Royalties)	Resident: 10 / 10 / 10; Non-resident: 15 / 15 / 15	Resident: 15 / 15 / 15; Non-resident: 20 / 20 / 20	Resident: - / 5 / 10; Non-resident: - / 5 / 10.

7.7. Household databases used

Table 13. Household survey data sources.

Country	Year	Database
Rwanda	2013-2014	Integrated Household Living Conditions Survey (EICV4), 2013-2014, Cross-Sectional Sample
Peru	2015	Encuesta Nacional de Hogares 2015 – Encuesta Continua
Nicaragua	2014	Encuesta Nacional de Hogares sobre Medición de Nivel de Vida 2014
Indonesia	2014-2015	Indonesian Family Life Survey 5 (IFLS 5)

7.8. Determining the land rent component of properties

In the household surveys, households are typically asked to state the value of the property they own, instead of separate information on the land alone.. Hence, we need to infer the land rent from the property value that is composed of land rent plus the value of structure (building) on the land. For this, we use additional information on structures and accessibility to certain public facilities. We estimate the property value based on this information and decompose it into a part that is related to the value of structure S and a part related to the value of land L (see Table 14). The basic regression model is

$$p_i = \alpha_S S_i + \beta_S + \alpha_L L_i + \beta_L + \varepsilon_i$$

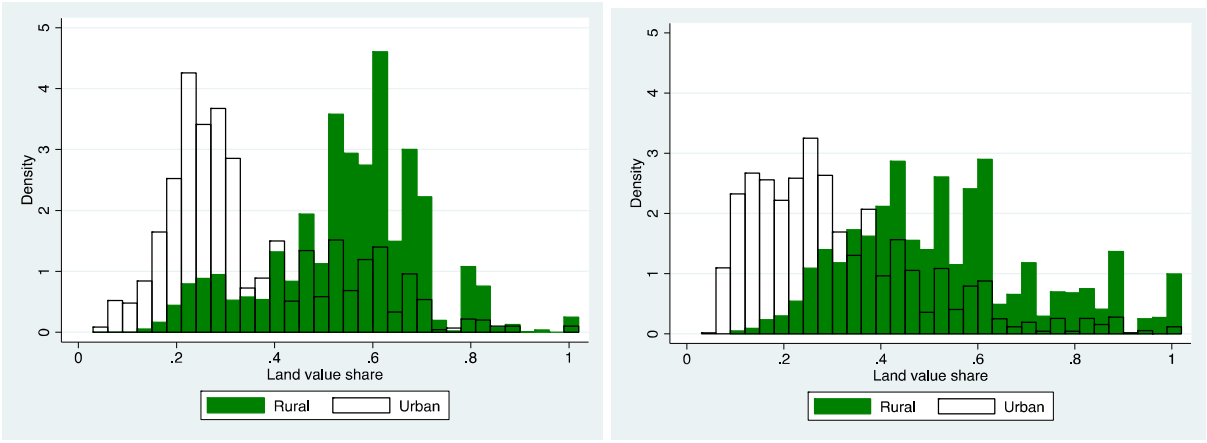
where $p_i = \log(PV_i)$ is the log of the property value rent PV_i of household i, S_i a vector of the structure variables (mostly dummies or categorical variables) that affect the value of the building, L_i a vector of variables that determine the land rent (see Table 14) and ε_i the error term. $\alpha_S, \alpha_L, \beta_L, \beta_S$ are to be estimated. β_L indicates the pure land rent without any improvements due to L_i and β_S the value of a building without any improvements. The estimated land value rent is $\widehat{LV}_i = \exp(\hat{\alpha}_L L_i + \hat{\beta}_L)$ and the estimated land value share of the property rent is accordingly $\widehat{LVS}_i = \frac{\widehat{LV}_i}{\widehat{PV}_i} = \frac{1}{\exp(\hat{\alpha}_S S_i)\, e^{\hat{\beta}_S}}$. One major problem is that the regression constants β_L, β_S are undetermined and only the sum $\beta_L + \beta_S$ is determined. We solve this issue by assuming that there exists property with a lent rent value share of one hundred percent, i.e. where the value of the structure is zero. Hence, we normalize $e^{\hat{\beta}_S}$ such that $\max_i \widehat{LVS}_i = 1$ after excluding the top 1% of the $\widehat{LVS}_i$ to account for outliers.

Table 14 Land and structure shares of property rent values: Regression factors

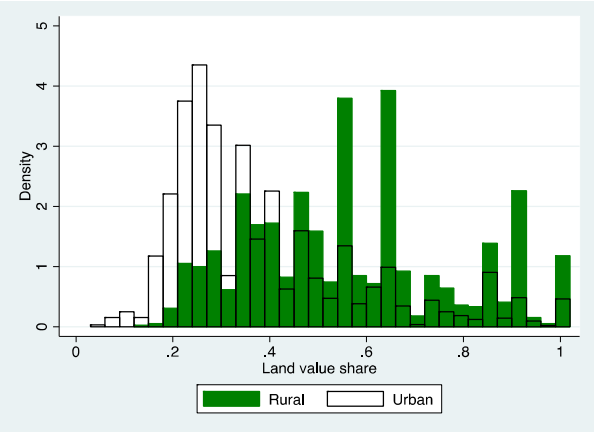
Country	Structure factors (S)	Land factors (L)
Rwanda	Dwelling type, number of rooms, wall material, rood material, floor material, cooking system, toilet system, water source, maintenance costs, lighting system.	Habitat type, surface area, distance from here to nearest (15): clean water source, food market shop, market for selling farm products, public transport stage, all-wealth roads, primary schools, secondary schools, district hospital, health center, administrative offices, internet services, public telephone in m2, environmental catastrophes nearby.
Peru	Dwelling type, number of rooms, wall material, roof material, floor material, dwelling construction assisted by expert (yes/no), housing adequacy, basic services in the house, energy use for light and cooking, construction license (yes, no), overcrowding (yes/no).	Type of settlement (according to population size), region, location (urban/rural), type of habitat, entitled property (yes/no), water system available (drink and wastewater), potable water available, environmental quality of water, electricity availability (lighting and cooking), and school nearby.
Nicaragua	Dwelling type, number of rooms (additional to bathrooms and kitchen), wall material, roof material, floor material, renovations (whether done and spending), air conditioning.	Region, location (urban/rural), type of access (e.g. paved road, path, river), water main connection (yes/no), connection to electricity grid (yes/no); availability of a garbage collection system, distance to medical center (transportation time), distance to school.
Indonesia	Dwelling type, house size, number of rooms, wall material, roof material, floor material, ventilation, kitchen location (outside vs. inside the house), renovations (done by type and spending).	District (dummies), existence of a yard, distance to main water source, distance to drinking water, distance to medical services (knowledge about nearby services and transportation time), availability of a garbage collection system , other characteristics of the quality of land (e.g. house is surrounded by water).

Figure 10 and Table 15 show the main results from regression: A histogram of land value shares for rural and urban households and some summary statistics on the estimated land value shares. Contrary to urban economics literature (Alonso 1964; E. S. Mills 1967; Muth 1968; E. Mills and Hamilton 1995), land value shares are higher in rural areas than in urban ones. For example, in Indonesia, rural areas have a median land value share of 52 percent whereas in urban areas it is only 45 percent of the property value. These shares look similar as the ones resulting from the regressions for Peru, Nicaragua and Rwanda.

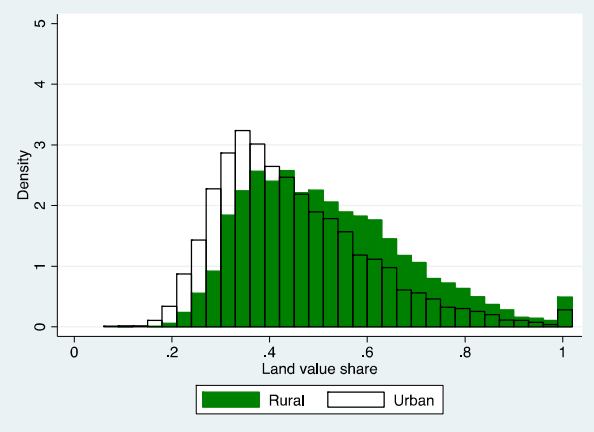
Figure 10. Regression results: land shares for all households according to urban and rural locations. Rwanda (a), Peru (b), Nicaragua (c) and Indonesia (d); mean values.



a) *b)*



c)



d)

Table 15 Regression outcomes: mean and standard deviation of the land value shares for the 4 countries (and the number of HHs included), for urban and rural areas.

	Obs	Rural		Urban	
	N° HH	Mean	St. dev.	Mean	St. dev.
Rwanda	12981	0.55	0.00	0.35	0.00
Peru	10893	0.53	0.00	0.31	0.00
Nicaragua	5254	0.56	0.00	0.39	0.00
Indonesia	9111	0.52	0.00	0.45	0.00

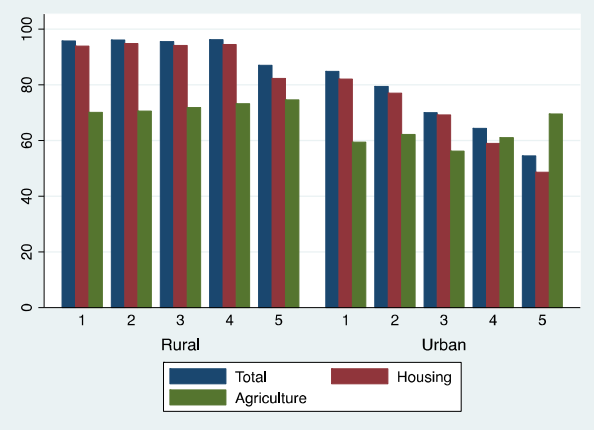
7.9. Case studies: additional information on quantitative analysis

Table 16. Further results of the micro simulation

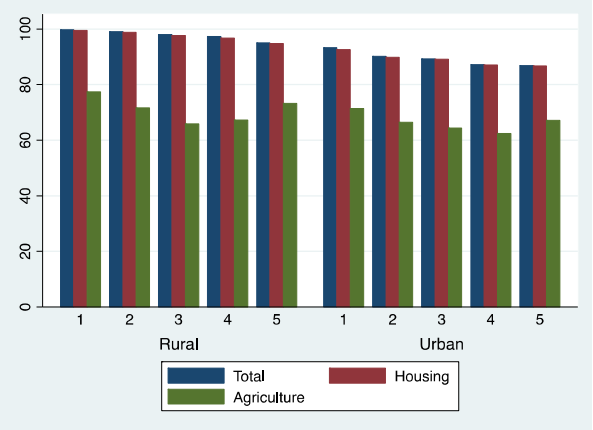
	Rwanda	Peru	Nicaragua	Indonesia
Tax payers in suggested scheme, N° HH (%)	2,219,040 (89%)	7,741,249 (91%)	1,069,663 (75%)	64,082,198 (91%)
with land value of poorest quintile exempted	1,434,397 (57%)	5,414,039 (63%)	712,114 (50%)	34,623,758 (49%)
Tax revenue (% of GDP) at 25% tax rate	1.35	0.25	1.87	0.86
with land value of poorest quintile exempted	0.98	0.15	1.45	0.61
Tax revenue (% of GDP) at 50% tax rate	2.69	0.49	3.74	1.71
with land value of poorest quintile exempted	1.96	0.30	2.91	1.22

7.9.1. Ownership

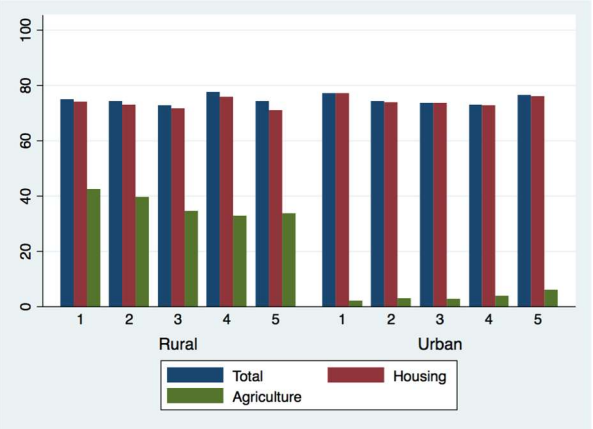
Figure 11. Ownership shares for different income quintiles (x-axis), for different land uses and location (urban and rural areas): Rwanda (a), Peru (b), Nicaragua (c) and Indonesia (d).



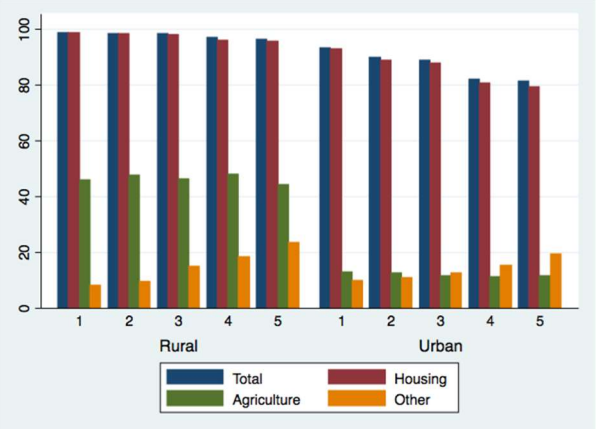
a)



b)



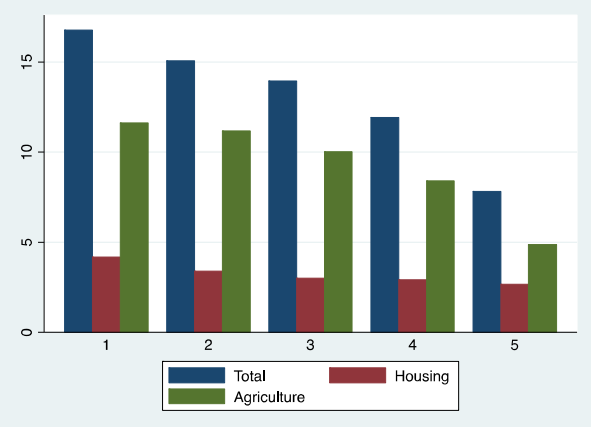
c)



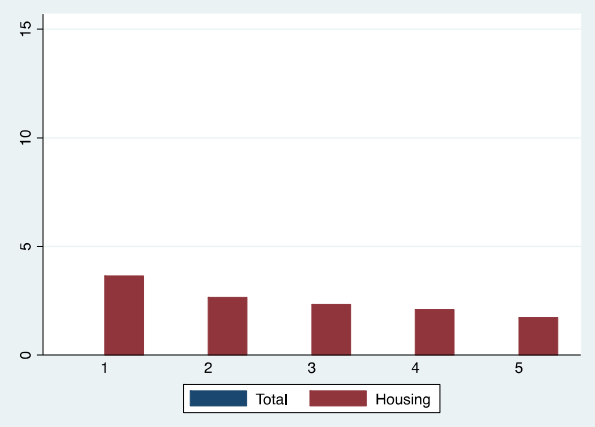
d)

7.9.2. Rent as a percentage of income

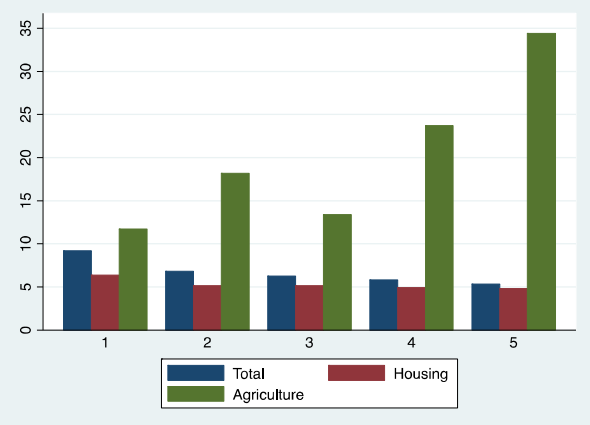
Figure 12 Rent as a percentage of income for different quintiles (x-axis) and land uses (median): Rwanda (a), Peru (b), Nicaragua (scale 0-35%) (c) and Indonesia (d). Only households owning the respective land type considered.



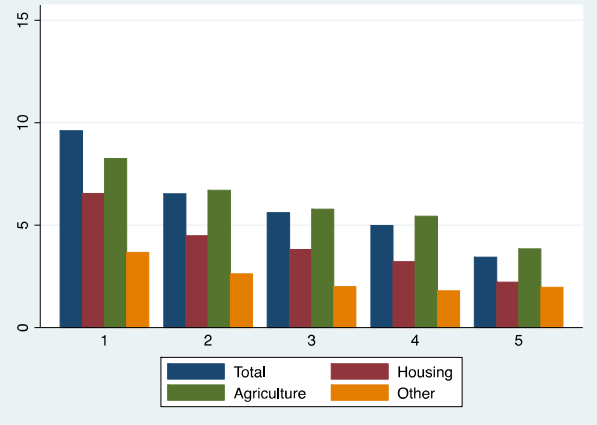
a)



b)



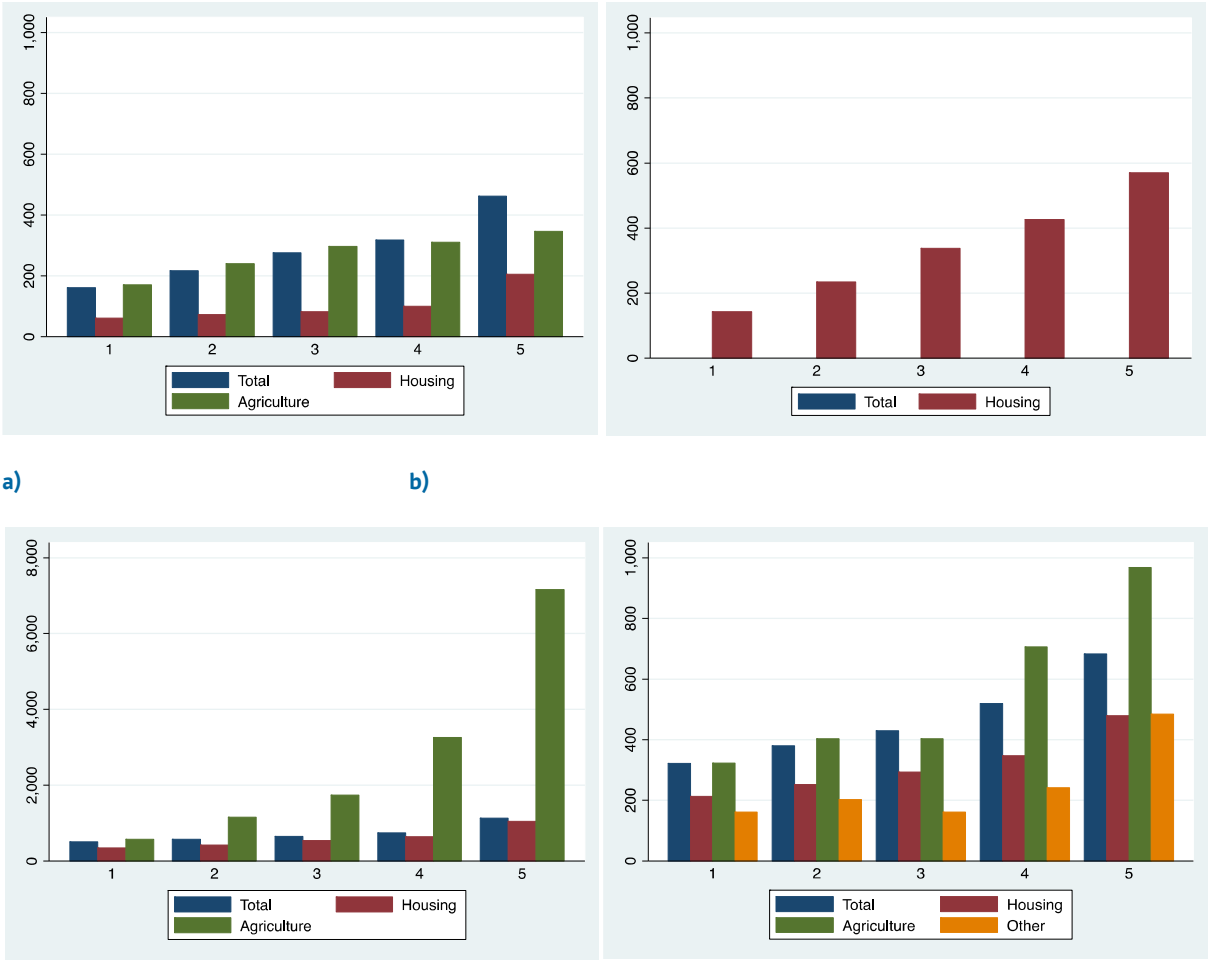
c)



d)

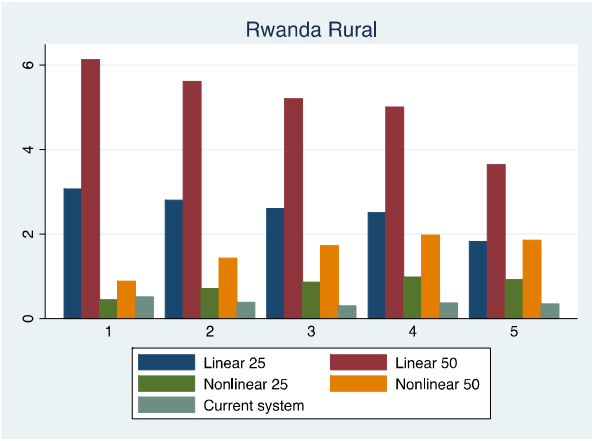
7.9.3. Median rent values

Figure 13 Median rent value for different quintiles (x-axis) and land uses in US $ (PPP): Rwanda (a), Peru (b), Nicaragua (scale 0-8000 US$) (c) and Indonesia (d).

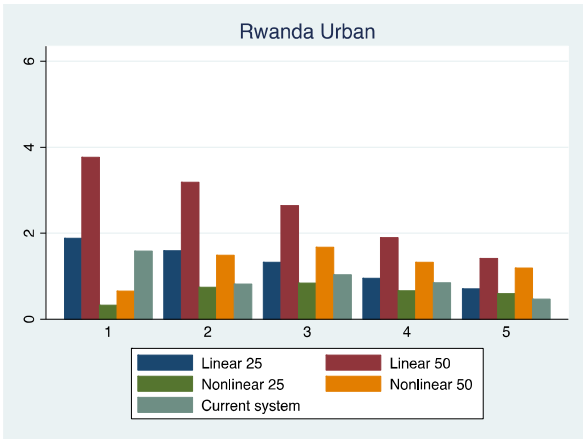


7.9.4. Suggested tax: tax-free amount based on land uses and location

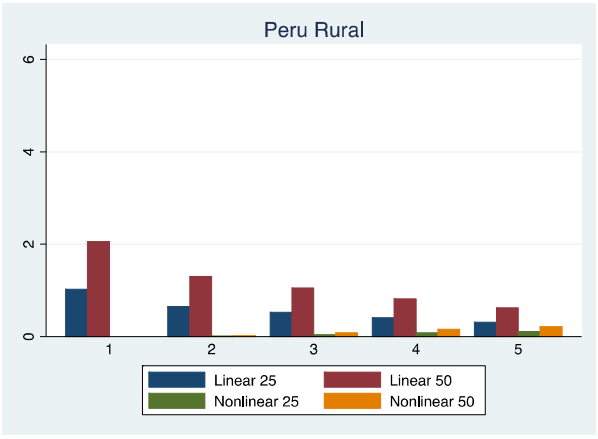
Figure 14 Distributional implications of a land tax system with a tax-free amount: Tax paid by each household as a percentage of total income as income quintiles (x-axis) for a 25 percent and 50 percent tax rate for the linear and the nonlinear system for Rwanda (a), Peru (b), Nicaragua (c) and Indonesia (d); (median). Tax-free amount based on land uses and location (urban, rural).



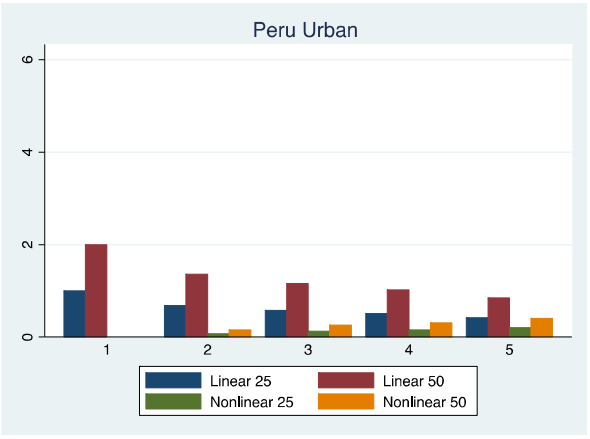
a.1)



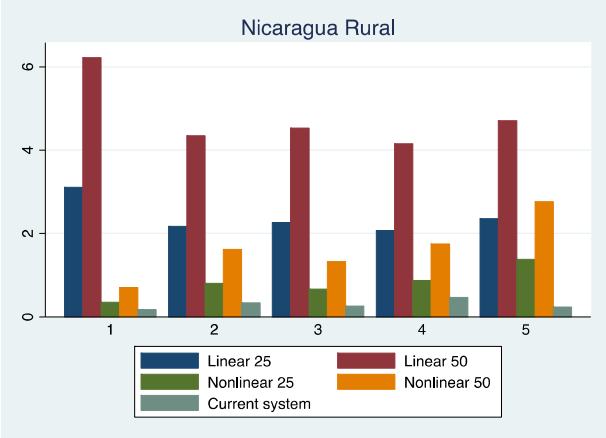
a.2)



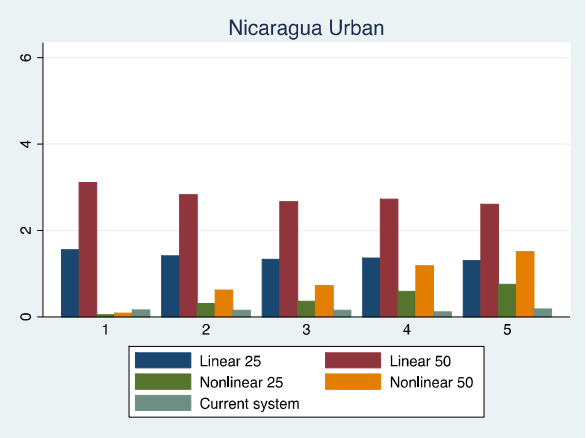
b.1)



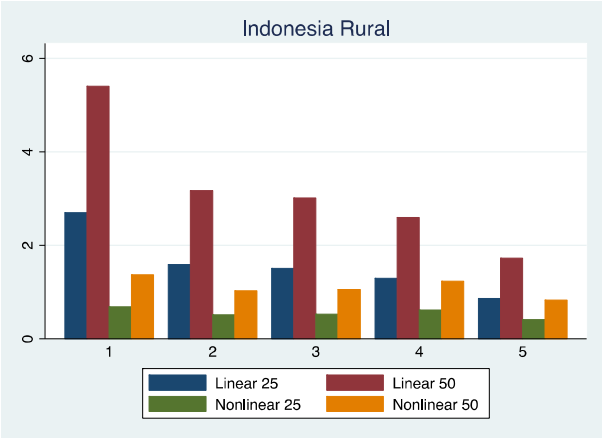
b.2)


Nicaragua Rural
0
2
4
6
1
2
3
4
5
Linear 25
Linear 50
Nonlinear 25
Nonlinear 50
Current system

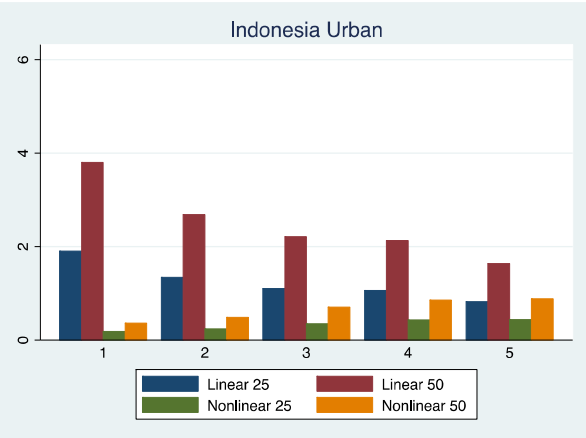
c.1)


Nicaragua Urban
0
2
4
6
1
2
3
4
5
Linear 25
Linear 50
Nonlinear 25
Nonlinear 50
Current system

c.2)


Indonesia Rural
0
2
4
6
1
2
3
4
5
Linear 25
Linear 50
Nonlinear 25
Nonlinear 50

d.1)


Indonesia Urban
0
2
4
6
1
2
3
4
5
Linear 25
Linear 50
Nonlinear 25
Nonlinear 50

d.2)

7.10. Agricultural land rents worldwide

Table 17 GTAP and World Bank Agricultural Land Rents. GTAP Land rents are from 2001; World Bank Land rents are from 2010 data; both have been adjusted to 2016 US$. Source (H.-L. Lee et al. 2009; World Bank 2011a).Values with "*" for the World Bank may be misleading as much of its land rent comes from urban areas, not well represented in the World Bank database.

	GTAP agriculture land rent			World Bank Land Rents
Country	**Agricultural land rent (million 2016 US$)**	**SAGE Land cover (1000h)**	**Average per ha. land rent (2016 US$)**	**Agricultural land rent (million 2016 US$)**
Hong Kong, China	549	286	1892	3*
Korea, Rep.	11291	9495	1189	5304
Switzerland	1936	4037	479	2095
Netherlands	1353	3220	421	4029
Singapore	119	310	385	0*
Denmark	1653	5216	317	2136
Sri Lanka	2193	7072	310	1363
Japan	11400	39938	286	11477
Germany	10274	36576	280	12758
Italy	7567	29358	258	13642
Bangladesh	3618	15334	236	8110
Belgium	710	3544	200	2410
Austria	1610	8159	198	2029
Philippines	5807	29996	194	12281
India	59350	309374	191	117691
France	10078	55032	183	17249
Rest of FT of the Americas	1733	9707	178	-
United Kingdom	4696	26429	178	6846
Bulgaria	1675	11155	151	1497
Czech Republic	1186	8018	148	1462
Greece	1544	12706	122	3796
Poland	3799	31557	121	10114
Thailand	6140	51464	119	13592
Ireland	934	7992	117	2149
Hungary	1017	9272	110	2171
Romania	2463	24190	102	6736
Croatia	595	6357	93	671
Spain	4683	50117	93	12797
Portugal	938	10976	85	1732
Vietnam	2252	30607	73	10182
Albania	191	2804	68	595
Rest of South Asia	11650	172583	68	-
Rest of the Caribbean	783	12108	64	-
China	61549	959967	64	195899
Indonesia	11235	179528	63	32075
Slovak Republic	304	4905	62	679
United States	57948	944153	62	91101
Mexico	11821	201568	59	13427
Slovenia	136	2364	58	0

Central America	2908	57628	51	-
Malaysia	1590	35898	45	1971
Rest of Europe	776	17742	43	-
Finland	1328	34690	38	3360
Uruguay	621	19022	33	1323
Venezuela, RB	3006	92272	33	3829
Turkey	2265	80189	29	17004
Rest of Southeast Asia	3253	115475	29	-
Sweden	1225	45343	28	2791
Colombia	3059	118348	26	10626
Chile	1964	85476	24	5819
New Zealand	698	31253	22	5824
Estonia	105	4681	22	0
Lithuania	174	8307	21	762
Uganda	439	21085	21	3949
Rest of EFTA	930	45562	21	-
Morocco	817	43195	18	3440
Tunisia	275	15911	17	1522
Rest of Form. Soviet Union	8562	498236	17	-
Argentina	4544	281209	16	13368
Rest of East Asia	2505	166020	16	-
Peru	1795	132233	13	4925
Latvia	77	6441	12	405
Rest of Middle East	5544	527500	10	-
Rest of Andean Pact	1302	133998	9	-
Malawi	88	10247	9	666
Rest of North Africa	3796	494191	8	-
South Africa	867	124641	7	6885
Tanzania	633	91472	7	0
Rest of South America	519	85625	7	-
Canada	5841	991138	7	13782
Rest of Oceania	233	41579	5	-
Zimbabwe	221	40476	5	979
Brazil	4470	852846	5	100879
Australia	3960	784874	5	13111
Madagascar	258	61660	4	1568
Rest of Sub-Saharan Africa	4563	1422515	3	-
Russian Federation	5283	1689470	3	23524
Zambia	128	74768	1	498
Mozambique	132	79791	1	866
Rest of S. African Cust. Union	86	87524	1	-
Botswana	55	58571	1	179
Rest of S. African Dev. Com.	301	362519	1	-
Taiwan	2245	0	-	-
Rest of North America	9	0	-	-
Luxembourg	109	0	-	103
Cyprus	35	0	-	0
Malta	18	0	-	84
Total	402380	13299093	0	-