Gender and Tax Incidence of Rural Land Use Fee and Agricultural Income Tax in Ethiopia

by Hitomi Komatsu, Alemayehu A. Ambel, Gayatri Koolwal, and Manex Bule Yonis

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Abstract

The rural land use fee and agricultural income tax are major payments for rural landholders in Ethiopia. This paper examines the gender implications of these taxes using tax payment and individual land ownership data from the Ethiopian Socioeconomic Survey 2018/2019. It finds that the rural land use fee and agricultural income tax, which are assessed on the area of landholdings, are regressive. Female-headed- and female adult-only households bear a larger tax burden than male-headed and dual-adult households. Norms limiting women's role in agriculture and gender agricultural productivity gaps are likely to result in lower consumption and accordingly, a higher tax burden for female-headed households than for male-headed households. Reducing the tax rates for smallholders can diminish the gender difference in tax burdens, but the tax continues to be regressive. This highlights the difficulty of area-based land taxes to be vertically equitable.

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Produced by the Research Support Team

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1. Introduction

Starting in the late 1990s, Ethiopia's rural land registration and certification process strengthened tenure security by recognizing rights that both women and men have to rural land (Deininger et al. 2008; Deininger et al. 2011; Holden and Tilahun 2020). Certificates for land use rights were issued with significant involvement of newly established land-use community representatives, including the requirement that at least one representative be a woman (Bezabih et al. 2016; Deininger et al. 2008). As a result, many women were named on land certificates (Holden et al. 2011).

The responsibilities of holders of rural land rights include payment of land use fee and agricultural income tax, which are determined by the total area of the land held (Hill et al. 2017). These land-based taxes constitute less than 0.5 percent of total tax revenue (Mesfin and Gao 2020) and tax rates vary by region. Land taxation is consistent with two principles of taxation, economic efficiency and ease of administration (Bird and Slack 2005; Skinner 1991). Land taxes are economically efficient because, with fixed land supply, they are unlikely to induce behavioral responses (Bird and Slack 2005). Area-based land taxes are often introduced, as in Ethiopia, where rural land markets do not exist or do not function well, making it difficult to administer value-based taxes (Franzsen and McCluskey 2017; Sah and Stiglitz 1985; Skinner 1991). However, a tax based on the land size is likely to undermine the equity principles because it is not always correlated with property values, productivity, or agricultural income (Bird and Slack 2005; Khan 2001; Norregaard 2013; Skinner 1991; Sah and Stiglitz 1985). Yet empirical analysis of the distributional impact of land taxes has received little attention (Norregaard 2013). Notable exceptions have found that area-based land taxes are regressive in Rwanda (Ali et al. 2020; Kalkuhl et al. 2018), in Indonesia, Peru, and Nicaragua (Kalkuhl et al. 2018), and in Ethiopia (Hill et al. 2017; Mesfin and Gao 2020).

Survey data on tax payments and individual disaggregated land ownership has also been scarce to better understand the distributional analysis of land tax policy. This includes understanding how tax burdens differ for the groups that are most economically vulnerable, such as women. This paper examines the gender implications of the tax incidence of the rural land use fee and agricultural income tax in light of expanded recognition of land rights on the one hand and the regressivity of area-based land taxation on the other. To estimate tax incidence, we use new data on household taxation and individual land ownership in the Ethiopian Socioeconomic Survey (ESS4) 2018/2019, part of the World Bank Living Standards and Measurement Study (LSMS). With what we know about the regressivity of these taxes in Ethiopia (Hill et al. 2017; Mesfin and Gao 2020), we assess horizontal equity by looking at tax burdens across gender-disaggregated households and individuals. Individual tax incidence is imputed in proportion to the amount of the household land a person owns, using self-reported ownership data.

There are two key findings from our study. First, the rural land use fee and agricultural income tax are regressive in that poorer households face a larger tax burden than wealthier households. Second, the tax burden of female-headed and female-only households (with no male adults) is 37 percent higher than for male-headed and dual adult households (with both male and female adults present), which violates the horizontal equity principle. The gender differences in household tax incidence persist when we impute tax liabilities using land area and regional tax schedules. There is also a gender difference in individual tax incidence, but the magnitude is smaller because the gender gap in individual landholdings is small.

There are several possible explanations for the horizontal gender inequity in taxation: (1) Research in Ethiopia has found a gender difference in agricultural productivity because of low agricultural productivity on farms rented out by women and women's lack of access to inputs, credit, extension services, and social networks (Aguilar et al. 2015; Ghebru and Holden 2015; Teklu 2005). Gender norms limiting women's involvement in agriculture have also forced women to rent out land, while receiving only half of the yield on the rented-out plots (Teklu 2005). Even though area-based land tax liabilities for land of similar area are the same, lower

productivity and consumption result in a higher tax burden for female-only and female-headed households. (2) Our data shows that 65 percent of female-only- and 58 percent of female-headed households are smallholders with less than 0.5 hectare of land, compared to about 40 percent of their male counterparts. Smallholders face the largest per-hectare tax rates. Our results suggest that area-based land taxation is likely to reinforce gender inequities in agriculture and constitutes an implicit bias arising from gender norms in agriculture, household structures, and the gender gap in agricultural productivity.

Because of the regressivity of current tax schedules, we conduct a tax incidence analysis of a hypothetical tax schedule with progressive per-hectare rates and exemptions for smallholders from paying agricultural income tax. We find that this is likely to decrease the tax burden of female-headed and female-only households, but the tax incidence continues to be regressive because land rights are prevalent among poor rural households. This illustrates how difficult it is for area-based land taxes to be vertically equitable.

Tax schedules vary by region. This analysis finds a substantial difference between self-reported tax payments and imputed tax liabilities using land area and the tax schedules from the regions of Amhara, Oromia, and Southern Nations, Nationalities and People (SNNP). We discuss possible sources of tax discrepancies, which include (1) the Revenue Bureau not having the most current titleholders and precise land area data; (2) different methods used to measure land area; and (3) possible errors by tax collectors assessing taxes or by household survey respondents reporting tax payments. These discrepancies highlight the importance of administrative tax data and land registries to complement survey data to examine whether the most current title holder and area information are used for estimating tax liabilities.

This paper contributes to the growing literature on the gender dimensions of taxation in low- and middle-income countries. Much of the literature discusses the gender implications of personal income tax and payroll taxes (see Elson 2006; Grown and Valodia 2010; Joshi et al. 2020; Lahey 2018; Stotsky 1997). Grown and Valodia (2010) also examine gender issues in indirect taxes using expenditure data for Argentina, Ghana, India, Mexico, Morocco, South Africa, Uganda, and the United Kingdom. Informal taxes have a gender dimension in Nigeria (Akpan and Sempere 2019) and Zambia (Ligomeka 2019). To the best of our knowledge, the gender-differentiated burdens of land taxation in low- or middle-income countries have not been studied. We aim to elicit new evidence in this relatively unexplored topic.

The paper also contributes to the empirical literature on the tax burdens of agricultural land taxes in low-income countries. Most of the empirical evidence on land taxation focuses on vertical equity (for example, Hill et al. 2017; Kalkuhl et al. 2018; Mesfin and Gao 2020). Specifically, Hill et al. (2017) and Mesfin and Gao (2020) impute the tax burden of the rural land fee and agricultural income tax in Ethiopia by assuming a constant per-hectare tax rate across all land area classes. Building on this evidence, we examine the horizontal equity from a gender perspective. Our findings on vertical and horizontal equity are relevant for countries where land taxation is area-based.

In what follows, Section 2 discusses the conceptual framework on gender and taxation and provides an overview of the rural land use fee and agricultural income tax, and of gender and land rights in Ethiopia. Section 3 describes the data and methodology, and section 4 presents the results and discussion. Section 5 provides a summary and draws conclusions.

2. Gender and Taxation: A Conceptual Perspective, and the Ethiopian Context

2.1 Vertical and Horizontal Equity of Taxation from a Gender Perspective

Vertical equity and horizontal equity are principles considered in assessing the fairness of taxation. Vertical equity is achieved when individuals with greater resources pay more than those with less, horizontal equity when individuals in the same circumstances are treated equally (Martinez-Vasquez 2001). When we consider equity from a gender perspective, it is clear that "same treatment" in taxation does not lead to gender equity in outcomes when there are structural inequities (Elson 2006; Grown 2010; Lahey 2018; UN Women 2015).

Stotsky (1997) argues that tax systems can have differential implications for women and men because of the social and economic arrangements, social norms, and the gender differences in expenditures, employment, and property and financial asset ownership. Such gender-differentiated impact, which Stotsky calls implicit gender bias, is often found in the provisions for personal income tax, indirect taxes, corporate tax, informal taxes, and property taxes (Grown and Valodia 2010; Joshi et al. 2020; Lahey 2018; Stotsky 1997).[1]

In order to overcome structural gender inequities and the disadvantages women face, Elson (2006) argues that tax systems should aim to transform existing gender-inequitable roles. Elson (2006) and Grown (2010) therefore propose that tax policies be evaluated on whether they reinforce and perpetuate gender inequities or whether they help to achieve gender equity. This study suggests that the rural land use fee or agricultural income tax should be assessed on whether it reduces or exacerbates gender inequities in agriculture and consumption and whether it is implicitly gender-biased.

2.2 The Rural Land Use Fee and Agricultural Income Tax

The ten regional governments of Ethiopia have a constitutional mandate to set and collect the annual rural land use fee and agricultural income tax (Mengistu et al. 2017; World Bank 2012). These taxes are lump sum amounts, which are assessed on the total landholding area used for agriculture (Hill et al. 2017; World Bank 2012).[2] Land area is therefore a proxy for agricultural income.[3] The tax liabilities vary by region. Appendix 1 shows the tax schedules for Amhara, Oromia, and SNNP regions, which are the regions whose schedules we have access to. The total tax liabilities for Amhara, for example, are much larger than for SNNP. The taxes also vary within each region depending on the availability of irrigation (Oromia), whether the land was used for specific high-value crops (SNNP), and whether it is a Productive Safety Net Program (PSNP) ward (Amhara) (Table 1). In the Afar Regional State, landholders are required to pay land tax according to whether they use the land for grazing or crop cultivation (ANRS 2009). In Benishangul Gumuz region, taxes are assessed on the area of land, fertility of land, weather, and suitable infrastructure (BGRS 2010). There is no tax exemption for smallholders.

Table 1: Features of the Rural Land Use Fee and Agricultural Income Tax

	Amhara	Oromia	SNNP
Taxes are assessed based on:	Total land area. Taxes are lower for Productive Safety Net Program (PSNP) *kebeles* (wards)	Total land area. Taxes are higher for farmers who use irrigation	Total land area. Taxes are higher for banana, coffee, chat, apple, and pepper plantations

Source: Amhara Regional State, Proclamation (No.161/2001), Proclamation to Amend Rural Land Use Payment and Agricultural Income Tax of Oromia Regional State's Proclamation (No.99/2005), SNNP Regional State, A Revised Proclamation to provide for rural land use fee and agricultural activities income tax (No. 122/2008).

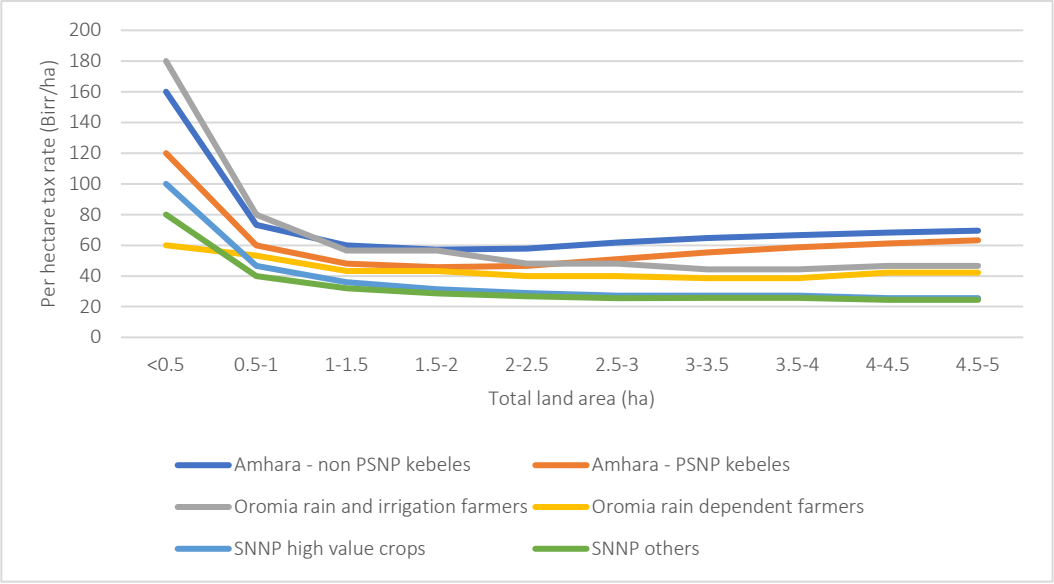
The average per hectare tax rates for Amhara, Oromia, and SNNP regions (calculated from the tax schedules) are regressive; they generally decline the larger the total landholding (Figure 1). Farmers with less than 0.5 hectare pay more tax per hectare than farmers with more land. In Figure 3, we show that 65 percent of female-only and 58 percent of female-headed households hold less than 0.5 hectare of land compared to only 38 percent of male-headed and dual adult households, and therefore face the largest per hectare tax rate.

[1] Explicit gender biases in tax systems arise when the letter of the law treats women and men differently (Stotsky 1997). There are no explicit gender biases in land taxation in Ethiopia.

[2] In Oromia, taxes are assessed on the area of rural land held by farmers for agricultural activities, including cultivation, breeding of livestock, forestry development, and fish development (ORS 2005).

[3] There is a livestock tax assessed on the number of livestock owned, but we do not include this in our analysis because the paper deals with land taxation.

Figure 1: Average Per Hectare Tax Rates, Rural Land Use Fee and Agricultural Income Tax, Amhara, Oromia, and SNNP Regions



Source: Amhara Regional State, Proclamation (No.161/2001), Proclamation to Amend Rural Land Use Payment and Agricultural Income Tax of Oromia Regional State's Proclamation (No.99/2005), SNNP Regional State: A Revised Proclamation to provide for rural land use fee and agricultural activities income tax (No. 122/2008).
Note: The average birr per hectare tax rate is calculated by dividing the total tax by the mid-point of the landholding classes; this is similar to the method used in Hill et al. (2017). See Appendix 1 for the tax schedules for the three regions.

The Bureau of Agriculture and Rural Development provides farmers' names and area of rural landholdings in the land registry to the Revenue Bureau (ORS 2005). The Revenue Bureau or the chairman of the *kebele* (ward) peasant association delegated by the Revenue Bureau collects the taxes from the farmers, who have until April 30 E.C. to make the payment (ORS 2005). Farmers are required to notify any changes in the landholders or the area of landholdings to the Revenue Bureau (ORS 2005).

2.3 Gender and Land Rights, Ethiopian Context

The government has taken considerable steps to formalize land rights for women and men. Land certificates were issued in the names of both women and men[4] but there were variations by region in implementing joint titling[5] (Deininger et al. 2008; Kumar and Quisumbing 2015). Subsequently, the Tigray region carried out the Second Stage Land Registration in 2014 to register the names of all parcel holders, with Amhara, Oromia, and SNNP regions following suit (Bezu and Holden 2014a; Holden and Tilahun 2020). As for other regions, Afar, Gambela, Benishangal-Gumuz, and Somali have adopted rural land use proclamations, and in 2016, first-stage land registration and certification began in Harari and Gambela (Hailu 2016). According to the Constitution, the state owns the land but every Ethiopian wishing to engage in agriculture can receive use rights for free (Deininger et al. 2008). Thus, individuals or households receive usufruct rights to land, not ownership, and are

[4] There is evidence that land registration has led to improvements in a number of areas, including increased investments in farms (Deininger et al. 2011), land productivity (Bezabih et al. 2016; Holden et al. 2011), caloric intake (Ghebru and Holden 2013), and tenure security (Deininger et al. 2008), particularly for female-headed households. The formalization of property rights has also empowered women to have a greater say in decisions about crop choices and renting out land (Bezu and Holden 2014a).

[5] When land certification started in the Tigray region in 1998, certificates were issued in the name of the household head—usually the husband of the principal couple in the household—because joint titling was not yet mandated (Deininger et al. 2008). It was subsequently mandated in other regions and in the second stage in Tigray region (Deininger et al. 2008).

prohibited from selling or mortgaging land (Deininger et al. 2008). There is no rural land sale market, and the land rental market is restricted except for Amhara (Deininger et al. 2008; Deininger et al. 2011).[6]

The 2000 Revised Family Code gives women and men equal rights to property in inheritance and during marriage, and equal division of assets in divorce (Kumar and Quisumbing 2015).[7] Despite these laws, different norms across locations and across ethnic and religious groups affect how land is allocated (Kumar and Quisumbing 2015). The primary way to gain access to land is by inheritance from parents, with older sons given preferential treatment (Bezu and Holden 2014b; Kosec et al. 2018). Women access land by marrying men with land (Bezu and Holden 2014b) or living with an adult son who inherited the land rights.

In the last 10 years, population increase has resulted in landlessness and farms becoming subdivided and smaller (Bezu and Holden 2014b; Holden and Tilahun 2020). Even when landholders have obtained perpetual use rights, their continuance is generally contingent on physical presence in the village, although there are variations by region[8] (Bezu and Holden 2014b). While the land certification program increased tenure security (Bezabih et al. 2016), there is evidence that landholders continue to feel insecure about their tenure because of the threat of expropriation for land redistribution (Ali et al. 2011; Deininger et al. 2011; Bezu and Holden 2014). The banning of land sales, limited access to land, the requirement for local residence to retain land rights, and tenure insecurity make it clear that in Ethiopia (1) there are no land markets; (2) there is a limited supply of rural land; and (3) landholders are not mobile. These conditions have important implications for guiding the assumptions used in the tax incidence analysis in section 3.

The gender productivity gap (Aguilar et. al. 2015; Bezabih et al. 2016; Ghebru and Holden 2015) and gender inequities in agriculture and consumption (Teklu 2005) have implications for the burden of area-based land taxes. In Ethiopia, it is considered inappropriate for women to engage in agricultural work, particularly ploughing with oxen (Ghebru and Holden 2015; Holden et al. 2011; Teklu 2005). When male-labor is not accessible, households without male adults rent out their land through sharecropping arrangements, often with male relatives (Bezabih et al. 2016; Ghebru and Holden 2015; Teklu 2005). However, women prefer to hire male laborers because sharecropping agreements can cost half of the crop (Teklu 2005). Sharecropper productivity is also lower on female-owned than on male-owned land (Ghebru and Holden 2015). Women farmers, the majority of whom are either divorced or widowed, have less access to land, agricultural inputs, and agricultural extension services, and their productivity is lower (Aguilar et al. 2015). Consequently, area-based land tax could constitute an implicit gender bias because women are likely to face a heavier tax burden than men when there is a gender productivity and consumption gap.

3. Data and Methodology

3.1 The Ethiopia Socioeconomic Survey (ESS4)

We draw data from the ESS4 2018/19, which collected general information about, for example, sociodemographic characteristics, asset ownership, and agricultural activities, and also asked about whether and how much households paid in land use fee and agricultural income tax (World Bank 2020a). It also elicited information about the employment of individuals, nonfarm enterprises, and ownership and rights to land and other assets. Individuals aged 18 and over in the same household were each interviewed in private to assess intra-household asset ownership. The response rates of eligible respondents on rural dwelling and non-dwelling

[6] For example, land could be leased for a fee but for no more than two years in Tigray (Tigray National Region State's Rural Land Usage Proclamation, No.23/1997) and for no more than five years, with two-year renewable contracts, in SNNP (The SNNP Rural Land Administration and Use Proclamation, No. 110/2007).

[7] The Family Law stipulates that all property is considered common property even if it is only registered in the name of one spouse (Holden and Tiluhan 2020).

[8] For example, landholders who leave the village for two years have their land rights forfeited in Tigray (Tigray National Regional State's Rural Land Usage Proclamation, No.23/1997); the duration of absence is three years in Afar (Afar National Regional State Rural Land Use and Administration Regulation, No. 4/2011).

land were over 93 percent (Hasanbasri et al. 2021). The survey teams made multiple visits to households from September 2018 to August 2019, each time covering different modules of the questionnaire (World Bank 2020a).

The final sample used in the analysis consists of 2,942 rural households; 3,122 male and 3,350 female respondents aged 18 or over were interviewed about their rights to and ownership of land. (See Appendix 2 for the number of households and respondents per region.)

3.2 Methodology

The analysis is presented here in two parts. First, in Sections 4.1 and 4.2, we give a descriptive overview of household composition, land ownership, and area of landholding by household types and sex of the respondent. Our analysis is restricted to rural agricultural land because that is the basis for assessing the tax. Agricultural land is defined as any plots that were used for agriculture in the previous 12 months. Because the state owns the land, to which households and individuals have usufruct rights, we define landholders as in Table 2. (Appendix 3 gives details on how the variables were constructed using the questions in the survey.)

Table 2: Agricultural Landholders' Definitions

Variable	Definition
Agricultural land	Agricultural land is defined as plots that were used for agriculture in the previous 12 months.
Landholding household	Households are landholders if at least one plot was granted to the household by leaders, was inherited, or was purchased.
Documented landholding household	Households are documented landholders if they have a title deed, certificate of ownership or customary ownership, certificate of occupancy, certificate of hereditary acquisition listed in the registry, or purchase agreement for at least one plot.
Individual landholder (self-reported)	Individuals are landholders when they have the right to use at least one plot, and the plot was granted to the household by leaders or was inherited or purchased. An individual who rents or sharecrops a plot is not the landholder.
Individual documented landholder (self-reported)	Documented landholders are named on the title deed, certificate of ownership or customary ownership, certificate of occupancy, certificate of hereditary acquisition listed in the registry, or purchase agreement for at least one plot.

To measure gender differences in landownership and rights and then to conduct the incidence analysis, we classify households and individuals in four ways:

- We disaggregate the analysis of the household by sex of the household head. However, the assignment of headship is often arbitrary, making it problematic to compare households (Grown 2010; World Bank 2019). This method has also been criticized for ignoring the heterogenous needs and constraints of female-headed households, and for masking the poverty and inequality that exist within male-headed households (Grown 2010; World Bank 2018; World Bank 2019). In Ethiopia, for example, because female household heads who are widowed or divorced are poorer than married female household heads (World Bank 2020b), putting them together as one category can be misleading (World Bank 2019).
- Households are classified by sex and marital status of the household head. Single individuals could be never-married, divorced, or widowed.
- Households are disaggregated into three groups by the following household composition: (1) dual male and female adult households; (2) female-only households with no male adults; and (3) male-only

households with no female adults.[9] This method of classifying households is useful because women living in a household with no male adults are likely to face different challenges than female household heads whose adult sons live with them. This is particularly relevant in Ethiopia, where gender norms limit women's role in agriculture and the presence of an adult son has implications for access to land (Bezu and Holden 2014b; Kosec et al. 2018).

- We disaggregate the individual-level analysis by sex of the respondent. This is valuable because it reveals the landownership status of women in male-headed households, who are otherwise hidden in the household-level analysis.

Using these household typologies by gender and definitions of land ownership, in the second part of the analysis in sections 4.3 and 4.4, we discuss the prevalence, tax payments, and incidence of land taxation and its implications for Ethiopia. The central question in assessing vertical and horizontal equity is how to rank households and individuals by their ability to pay—a proxy measure for the "same" circumstances. Household expenditures should be adjusted by some measure of the household size, such as per capita or adult equivalence scales, because poverty could be underestimated if poorer households are larger than wealthier households (Deaton and Zaidi 2002; Lustig 2018). However, the per capita approach has been criticized for assuming the consumption needs of adults and children are the same, which overestimates the incidence of poverty when there are many young children in large households (Lustig 2018; World Bank 2018). We therefore order households by spatially-adjusted adult equivalent consumption into four quartiles to take into account household size and the demographic composition of household members.[10] Households are ranked according to their positions in the expenditure distribution of all rural and urban households and individuals by their positions in the expenditure distribution of all individuals. As a welfare measure, we use annual household expenditure consumption, which is the sum of the annual value of food consumption and expenditures on nonfood items,[11] education, meals out, and utilities.[12]

Property taxes assessed on the value of land and buildings could affect the property investment decisions of owners (Bird and Slack 2005).[13] However, the land tax in Ethiopia is area-based, not value-based. The Ethiopian policy contexts—a tax on land area, fixed supply of land, no land market, and immobile landholders—are consistent with the assumptions that predict that the tax burden falls entirely on landholders, who cannot relocate because of the risk of losing their land rights. Further, in low-income countries, property taxes are not expected to affect property owner decisions to move to a lower tax jurisdiction because they do not receive adequate local public services (Bird and Slack 2005; Brockmeyer et al. 2021; Kalkuhl et al. 2018). They are also

[9] The Instructional Guide on the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI) (Malapit et al., 2015) uses this classification.

[10] Tax incidence studies typically group households into five quintiles rather than four quartiles. Because grouping female-headed landowning households into consumption quintiles results in a small sample size, we classify them into quartiles.

[11] Nonfood items include personal care products, clothing, tobacco, transport, household fuel, costs for domestic and household services, spending on housing, and contributions to informal social security and community development.

[12] Expenditures are considered to be a better welfare measure than income for measuring living standards because farmers' incomes fluctuate between seasons and over years, and there are practical difficulties in measuring rural incomes (Deaton and Zaidi 2002; Martinez-Vasquez 2004).

[13] Much of the literature on the theory of property tax incidence focuses on urban property taxes with a tax on the value of land (Brueckner 1986; Feldstein 1977); an untaxed agricultural sector (Muthitachareon and Zodrow 2012); or an assumption of landowners as absentee landlords (Pasha 1990). There are three broad views on the incidence of property tax. In the *traditional view*, property tax has two components, namely land and capital or structures (Fullerton and Metcalf 2002; Simon 1943). Incidence of a land tax falls entirely on landowners because there is a fixed supply of land, and a tax on capital improvements is shifted to tenants because capital owners can avoid the economic burden by moving capital to other jurisdictions (England 2016; Zodrow 2001). The *new view* uses a general equilibrium framework with mobile capital, which responds to property tax rates in different cities (Mieszkowski 1972; Zodrow 2001). Property tax is relatively more progressive because capital owners bear the property tax burden, but the progressivity could be reduced by shifting the burden to housing consumers and landowners (Fullerton and Metcalf 2002; Zodrow 2001). The *benefit view* regards property tax as a user fee that perfectly mobile residents pay to receive their desired levels of local public services; this is consistent with the benefit principle of taxation (Norregaard 2013; Zodrow 2001).

unlikely to adjust the area of land in response to changes in tax rates. We therefore assume that landholders bear the full burden and behavioral responses are not expected.

The tax incidence of the rural land use fee and agricultural income tax is measured at two different levels. First, we calculate tax incidence as the household payments of land use fee and agricultural income tax as a proportion of annual nominal total household expenditure.[14] Second, we impute individual taxes by assigning household tax payments to the individual in proportion to the individual's share of household land.[15] Individual tax incidence is derived by dividing the individual's imputed tax payments by per capita expenditure.

Our empirical approach has the following limitations. First, the analysis is a first-order approximation of tax incidence and does not consider behavioral responses—although, as noted, area-based land taxes are unlikely to cause such responses. Second, although we assume that the self-reported tax payments recorded in the survey are accurate, there could in fact be a recall or reporting error on the part of respondents. For this reason, we conduct a sensitivity analysis by estimating the tax incidence using tax liabilities estimated from land area and the regional tax schedules in section 4.4b. Lastly, we examine self-reported individual landholdings and the associated tax burdens, but our analysis does not investigate intra-household gender relations.

4. Results

4.1 Household and Individual Characteristics

Table 3 shows demographic and other characteristics of all rural households by household type. (See Appendix 4 for characteristics of individual male and female respondents and Appendix 5 for household characteristics disaggregated by household head marital status.) Statistically significant differences ($p<0.05$) are reflected in bold (1) between male- and female-headed households, and (2) between female-only and dual-adult households. Female-only households are a subset of the female-headed households: just over half of female-headed households (57 percent) have no male adult present. An adult son lives in 30 percent of female-headed households. Far more female respondents in general are married (71 percent) than female household heads (28 percent).

Because of the gender norms limiting women's roles in agricultural work, a higher share of female-only and single female-headed households (21 percent) sharecrop or rent out land than dual-adult households (11 percent) and married female-headed households (9 percent). Female-only and single female-headed households are also more vulnerable economically; of those who sharecrop out land, separate estimates show that they receive only 43–48 percent of agricultural yield, with female-only households at the lower end of this distribution, and their annual household expenditure is lower than that of their male counterparts. Also, only 17 percent of single female-headed households receive financial support from friends or family, compared to 24 percent of married female-headed households (see Appendix 5).

Table 3 also shows that female-only and female-headed crop-farming households are less likely to receive extension services than male-headed households. These differences in household composition are important

[14] For tax incidence studies using a similar method, see for indirect tax incidence (which ranks households by per capita expenditure or income and calculates incidence by using total household expenditure or income in the denominator) Grown and Valodia (2010) for Argentina, Ghana, India, Mexico, Morocco, South Africa, Uganda, and the United Kingdom; Cronin et al. (2012) for the United States; and Anyaegbu (2010) for the United Kingdom.

[15] We calculate the proportion of land held by the respondent by (1) dividing the area of the parcel by the number of co-holders (as reported by the respondent); (2) summing up the total area of land held by the individual across all parcels to obtain total area of the individual's landholdings; and (3) dividing the individual's land area by the household's total land size. There is extensive literature on the "sharing rule"—how individuals within the households share resources (Browning et al. 1994; Browning and Chiappori 1998). Although there are gender biases in land allocation, because the 2000 Revised Family Code gives spouses equal rights during the marriage and equal division of assets in divorce (Kumar and Quisumbing 2015), we rely on the respondents' self-reported landholding status to identify landholders, and for jointly held plots, we assume that the landholders have equal shares.

in highlighting gender inequalities in access to these services. Single female-headed households and female-only households are also more likely to be subsistence farmers (30 percent) than male-headed and dual adult households (24 percent).

Table 3: Rural Household Characteristics by Household Type

	Head of Household		Household Sex Composition		
	Male	Female	Dual adult	Female-only	Male only
Household characteristics					
Age of household head	**44.5**	**46.9**	44.9	46.1	42.5
Head is married	**94.9%**	**27.7%**	**90.2%**	**22.3%**	28.0%
Household size	**5.3**	**3.6**	**5.3**	**3.0**	2.3
Adult son of the head lives in household	**23.6%**	**29.7%**	**29.0%**	**0.0%**	15.3%
Household receives cash or in-kind transfers from family or friends	**8.7%**	**19.0%**	**9.3%**	**20.9%**	16.6%
Total annual household expenditure (Birr)	**49,091.9**	**37,096.8**	**49,233.9**	**30,171.3**	34,104.2
Percentage of households engaged in subsistence farming	**23.6%**	**29.4%**	24.0%	30.3%	29.2%
Number of households	*2,157*	*785*	*2,402*	*436*	*104*
Rent/sharecrop out agricultural land[a]					
=1 if rent out or sharecrop out land	**10.4%**	**17.7%**	**10.6%**	**21.1%**	12.3%
Number of households	*2,041*	*754*	*2,265*	*428*	*102*
Percentage of crop farming households that received extension services					
Received extension services	**40.4%**	**32.1%**	**40.6%**	**28.0%**	18.2%[c]
Number of crop farming households	*1,682*	*466*	*1,852*	*235*	*61*

Note: Equality of means tests were conducted between (1) male- and female-headed households, and (2) female-only and dual adult households. Significant differences at $p<0.05$ are in bold.

[a] This indicator is missing for some households, including the Somali region, where the post-planting module was not administered due to security concerns. Households with no landholdings are classified as not able to rent out land. Household sampling weights are used.

4.2 Gender Differences in Agricultural Landholdings

Rural livelihoods in Ethiopia depend primarily on agriculture and most adults in these areas have land holdings. However, there is considerable variation by region and gender. Over 90 percent of all households and over 70 percent of all respondents are landholders, but women and female-only households fare worse than men and dual-adult households, particularly in documented land rights (Table 4). Only 70 percent of female-only households have documented land rights compared to 84 percent of dual adult households. Individual male respondents (73 percent) are slightly more likely than females (70 percent) to be landholders and documented landholders (55 percent for men, 48 percent for women).

The gender difference in landholdings exists in Oromia, SNNP, and Somali regions in southern Ethiopia (Appendix 6). The gap is consistent with previous studies, which indicates the decline of women's status as we move from north to south, although there are variations within regions due to cultural norms (Fafchamps and Quisumbing 2002).

There are gendered landholding patterns by households. Almost all male and female landholders in male-headed and dual-adult households have joint land rights (Figure 2). In contrast, most women landholders in female-headed- and female-only households have exclusive land rights. The linear probability model in Appendix 7 predicting whether a landholding respondent is a joint holder shows that women living with an adult son are

likely to have joint land rights as older sons tend to be given preference in inheriting land rights (Bezu and Holden 2014b; Kosec et al. 2018), and women living with adult sons have land rights jointly with them.

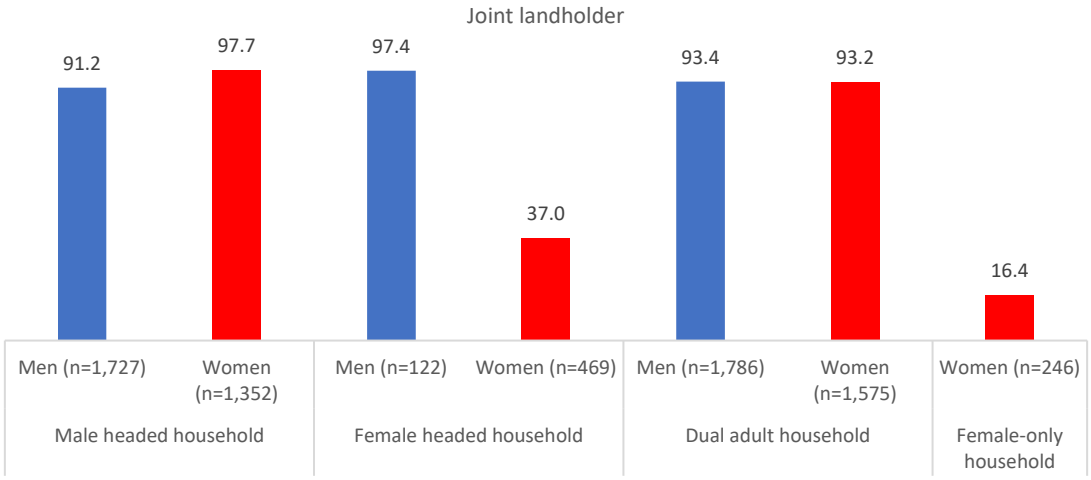
Table 4. Prevalence of Agricultural Landholdings by Household Type and Sex of Respondent

	1. Head of Household			2. Sex of Respondent	
	Male	Female		Men	Women
=1 if landholding household	**93.8%**	**84.7%**	=1 if landholder	**73.2%**	**70.0%**
=1 if documented landholding household	**83.0%**	**74.4%**	=1 if documented landholder	**54.6%**	**47.7%**
Number of households	*2,157*	*785*	*Number of respondents*	*3,122*	*3,350*

	3. Household Sex Composition				4. Marital Status of Household Head	
	Dual adult	Female-only	Male-only		Married male-headed	Single female-headed
=1 if landholding household	**93.5%**	**82.0%**	83.3%	=1 if landholding household	**94.2%**	**86.3%**
=1 if documented landholding household	**83.5%**	**70.0%**	56.3%	=1 if documented landholding household	83.6%	78.9%
Number of households	*2,402*	*436*	*104*	*Number of households*	*1,999*	*522*

Notes: Tests of equality of means were conducted between (1) male- and female-headed households, (2) male and female landholders, (3) dual adult and female-only households, and (4) single female-headed and married male-headed households. Significant differences at $p<0.05$ are in bold. Household sampling weights are used.

Figure 2. Landholding Respondents Who Are Joint Landholders by Household Type, Percent



Notes: Household sampling weights are used. Based on respondents' self-reporting, 80 percent of male landholders in female-headed households are adult sons of household heads.

a) Gender Difference in Area of Agricultural Landholding

There is a gender difference in land size by households. Male-headed households' landholding size is about 35 percent larger than that held by female-headed households (Table 5).[16] These differences in land area persist across the expenditure distribution (see Appendix 8). Female-headed and female-only household landholdings

[16] A recent study reached the same result using 2016 land registry data in the Tigray region (Holden and Tiluhan 2020). They also found that women own half of all landholdings, which also corroborates our findings.

are small partly because land distribution was based on family size (Ali et al. 2011), and those categories tend to have smaller households. The adult-equivalent land areas do not differ much across gender-disaggregated households or at the individual-level. There is an almost equitable distribution of farm areas held by women and men, because women and men in male-headed households are joint holders and women in female-headed households are exclusive holders.

Total area of landholding is less than 0.5 hectare for 58 percent of female-headed households and 65 percent of female-only households, compared to only about 40 percent of male-headed and dual-adult households (see Figure 3). This is concerning: A farm smaller than 0.5 ha is not large enough to support a sustainable livelihood (Holden and Tilahun 2020), and the per-hectare average tax rate is highest for this land size class (see Figure 1). Thus, not only are female-headed and female-only households disadvantaged because their farms are so small, but they also have to pay a higher per-hectare rate in taxes.

Table 5. Average Area of Agricultural Land Held by Households and Individuals, Hectare

A. Landholding Households

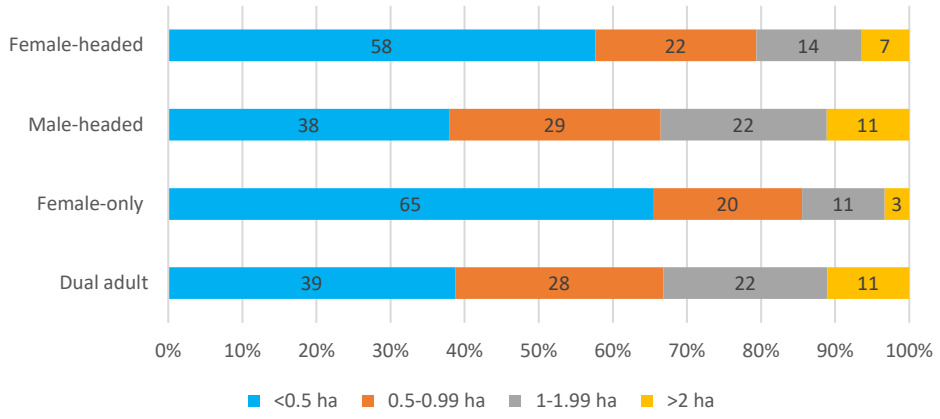
	Male-headed	Female-headed	Dual adult	Female-only	Male only
Total ag. land area (ha)	**0.92**	**0.68**	**0.92**	**0.53**	0.75
Adult equivalent farm area (ha)	0.23	0.27	0.23	0.27	0.42
Number of landholding households	1,740	556	1,923	303	70

B. Sex of Landholder

	Men	Women
Individual-level ag. land area (ha)	0.44	0.43
Number of landholding respondents	1,787	1,775

Notes: In panel A, the household's total agricultural landholding area is calculated by adding up the GPS-measured area of plots. Self-reported measured land area is used where the GPS measurements are missing. Because the area of land sharecropped out is missing from the survey, we use the median area of land rented in or sharecropped in at the zone level for parcels sharecropped out. These methods resulted in the land measurement being missing for 47 landholding households. In panel B, the area of individual agricultural land area is imputed by dividing the respondent's parcel area by the number of landholders and summing up the individual's apportioned area across the parcels. Tests of equality of means were conducted between (1) male- and female-headed households, (2) female-only and dual adult households, and (3) male and female respondents. Significant differences at $p<0.05$ are shown in bold.
The analysis dropped the top and bottom 1% of farm area values. Also, we use household sampling weights.

Figure 3. Area of Landholdings by Household Type, Percent



Note: This figure shows the size of landholdings (in hectare) among landholding households. Household sampling weights are used.

4.3 Prevalence and Payment of the Rural Land Use Fee and Agricultural Income Tax

a) Prevalence

Close to 80 percent of landholding households and 84 percent of documented landholding households pay a rural land use fee and agricultural income tax (Table 6). This corroborates the World Bank finding (2012) that farmers regard paying these taxes as a proxy for having title to the land. It is possible that in Ethiopia households make tax payments a priority to ensure continuance of their land rights given the tenure insecurity, population growth, and land shortages.[17]

Table 6. Households that Paid a Rural Land Use Fee and Agricultural Income Tax, Percent

	All Households	Landholding Households	Documented Landholding Households
Percent of households who paid land tax	74.3	79.3	84.2
Number of households	*2,942*	*2,343*	*1,900*

Note: Household sampling weights are used.

b) Average tax payments

Table 7 compares self-reported taxes (column A) with imputed tax liabilities using land area and the tax schedule of the region where the households reside (column B). The analysis for this table is restricted to Amhara, Oromia, and SNNP, the only regions for which we have tax schedules. We find that the mean difference in tax liabilities, in Birr, increases with land area class (column C), but the mean difference in percentage terms (column D) is larger for small landholders with less than 0.5 ha than it is for large landholders.

Why is there a large discrepancy between self-reported tax payments and imputed tax liabilities? There are several possibilities. First, the Revenue Bureau or the chairman of the *kebele* (village) peasant association, delegated by the Revenue Bureau, may not have the most current landholder data and agricultural land area for tax assessment. Some of the land registries may not have tracked changes in ownership (World Bank 2012), and the land registry from the first stage registration is paper-based, making it difficult to update information on land title and farm area (Bezu and Holden 2014a). Four regions (Amhara, Oromia, Tigray, and SNNP) are conducting second-stage registration to update the land registry but each is moving at a different pace (Bezu and Holden 2014a). Yet the average land size has been declining for the last 10 years because of subdivision of farms (Holden and Tilahun 2020), which suggests that tax liabilities calculated with outdated information from the land registry may overestimate farmers' tax liabilities.

Second, different methods used to measure land area could be another source of the discrepancy. The first-stage land certification process obtained the area of farms using low-cost methods and local technologies, such as ropes and measuring tapes (Bezu and Holden 2014a; Deininger et al. 2008). Farmers are expected to provide updated information to the Revenue Bureau, but it is not clear whether this happens, and if it does, whether farmers provide land area data using self-reports, tapes and ropes, or GPS measurements.[18] Measurement discrepancies would result in different tax assessments for an area-based tax.[19]

[17] As a comparison, about 60 to 70 percent of property owners in Lima, Peru, paid property taxes, with the compliance rate (percentage of owners paying taxes) ranging from 25 to 90 percent depending on the district (Del Carpio 2014). In Mexico City, the compliance rate is about 60 percent (Brockmeyer et al. 2021). At the other extreme, in the city of Kananga, Democratic Republic of Congo, only 8.8 percent of property owners pay property taxes (Bergeron et al. 2021).

[18] Carletto et al. (2017) find a discrepancy in land area estimates between these three methods in Ethiopia, with farmers owning small plots overestimating their land area compared to GPS methods, while farmers owning larger plots underestimating it.

[19] Second-stage registration is using GPS devices and satellite imagery to update farm areas, but the specific technology used for measuring land size (for example, handheld GPS devices or precision GPS devices) varies by location (Bezu and Holden 2014a; Holden and Tilahun 2020).

Third, tax collectors may have made assessment errors, or households may have made recall or reporting errors in the survey about how much tax was paid. Because of these discrepancies, in the next section, we will present the tax incidence using both the self-reports and imputed taxes.

Table 7. Self-Reported Tax Payments and Imputed Tax Liabilities in Amhara, Oromia, and SNNP Regions

	A	B	C	D	
	Self-reported tax payments (Birr)	Imputed tax liabilities in Amhara, Oromia, SNNP (Birr)	Mean difference in tax liabilities in Birr (A-B)	Mean difference/imputed tax in % (C/B)	Number of households
Total land area (ha)					
<0.5	111.1	23.4	87.8	376%	557
	(131.9)	(9.0)	(131.8)		
0.5-0.99	178.8	42.5	136.2	320%	334
	(164.9)	(7.3)	(164.4)		
1-1.99	213.9	66.6	147.4	221%	246
	(188.7)	(13.8)	(185.6)		
>=2	295.8	130.1	165.7	127%	101
	(220.2)	(53.6)	(217.8)		
All	167.3	46.9	120.3	256%	1,238
	(174.1)	(35.9)	(165.8)		

Notes: The sample is restricted to landholding households in the three regions. Standard deviations are provided in parentheses.

4.4 Tax Incidence of the Rural Land Use Fee and the Agricultural Income Tax

a) Tax Incidence Using Self-Reported Tax Payments

Table 8 shows the tax incidence for landholding households in panels 1, 3, and 4 and for landholding individuals in panel 2. Figure 7 is a graphic representation of Table 8. Tax incidence is highest in the poorest quartile and lowest in the richest, confirming a regressive pattern, and consistent with other studies in Ethiopia (Hill et al. 2017; Mesfin and Gao 2020). The regressive pattern can be explained by the high prevalence of rural households with land rights and the uniform land area average across the expenditure distribution (see Appendix 8). The regressivity is also apparent when tax incidence is calculated for the full sample of rural and urban households (see Appendix 9A). The poorest female-only and dual-adult households (panel 3) bear a tax incidence of 0.8 percent and 0.7 percent, respectively, and the poorest respondents are subject to an individual tax incidence of 2 percent (panel 2).[20] Our data (see Table 3) showed that 30 percent of female-only and female-headed households and 24 percent of dual-adult and male-headed households are subsistence farmers, for whom even a small tax payment could increase poverty.

Looking at horizontal equity, the tax incidence for female-only and female-headed households is 37 percent higher than for dual-adult and male-headed households. Moreover, the tax incidence of single female-headed households is 43 percent higher than that of married male-headed households (panel 4). The gender difference in tax burdens generally persists across the expenditure distribution.[21] For the individual-level results, the gender difference in tax incidence exists but is smaller. The tax incidence of female landholders is 11 percent

[20] There is very little data with which to compare the tax burdens of property taxes, but Norregaard (2013) estimates that among property owners in Denmark, tax incidence of individuals in the poorest decile is 1.8 percent of per capita income, similar to our estimates. Property tax in Denmark is also regressive (Norregaard 2013). For other examples, in Mexico City the poorest owners bear a property tax of about 1 percent of household income (Brockmeyer et al. 2021), and in Rwanda the rural property tax for the poorest households is approximately 0.5 percent (Kalkuhl et al. 2018).

[21] These results are generally consistent for all rural households, not just those with land, because the majority of rural households have land rights (see Appendix 9B).

higher than that of male landholders. The difference is smaller than at the household-level because the gender gap in individual land size is small. Our results suggest that gender differences in tax burdens depend on whether the analysis is conducted at the level of the household or the individual—which points to the importance of data on individual ownership to reveal such differences and to ensure that policies are effectively targeted.

There could be several reasons for the horizontal gender tax inequity. First, while tax liabilities for equal-sized farms are the same, area-based land taxation results in a heavier tax burden on households with lower productivity and consumption. This is confirmed when tax incidence is disaggregated by land area classes (Table 9), where the tax burden on female-only households with less than 0.5 hectare of land is 47 percent higher than for dual-adult households. Researchers have found a gender productivity gap (Aguilar et al. 2015[22]; Ghebru and Holden 2015) and lower sharecropper yields on women-owned than on men-owned farms in Ethiopia (Ghebru and Holden 2015). Households with no male adults have to sharecrop their land because of taboos against women working in agriculture (Bezabih et al. 2016). These factors would lower consumption for female-only and female-headed households. Second, for most female-only and female-headed households, the landholding size is less than 0.5 hectare, compared to about 40 percent for dual-adult and male-headed households. These smallholders face the highest per hectare tax rate.

From a gender perspective, land taxes seem to reinforce existing gender inequities because they place a heavier burden on female-headed- and female-only households, who already face several areas of disadvantage in agriculture and consumption.

[22] Although the analysis of Aguilar et al. (2015) focuses on female farm managers, not female-headed households, 95 percent of female managers are in fact heads of households.

Table 8. Tax Incidence

Panel 1

Household tax incidence

Exp. Quartile	Male-headed	Female-headed
Poorest	0.71	0.71
2	**0.37**	**0.74**
3	**0.31**	**0.52**
Richest	**0.20**	**0.36**
Total tax incidence	**0.46**	**0.62**
Number of households	*1,755*	*553*

Panel 2

Imputed individual tax incidence

Exp. Quartile	Male holders	Female holders
Poorest	1.96	2.03
2	**1.01**	**1.16**
3	0.72	0.81
Richest	0.38	0.46
Total tax incidence	**1.07**	**1.19**
Number of respondents	*1,726*	*1,731*

Panel 3[a]

Household tax incidence

Exp. Quartile	Dual headed	Female-only
Poorest	0.71	0.76[d]
2	**0.40**	**0.83[d]**
3	0.33	0.43[d]
Richest	**0.21**	**0.42[d]**
Total tax incidence	**0.47**	**0.65**
Number of households	*1,935*	*303*

Panel 4[b]

Household tax incidence

Exp. Quartile	Married male-headed	Married female-headed	Single female-headed
Poorest	0.71	na[e]	0.73
2	**0.36**	na[e]	**0.79**
3	0.30	na[e]	0.48[d]
Richest	**0.21**	na[e]	**0.45[d]**
Total tax incidence	**0.45**	0.56	**0.65**
Number of households	*1,969*	*260*	*518*

Notes: The sample is restricted to landholding households and respondents. For in panels 1, 3, and 4, household tax incidence is calculated by dividing self-reported tax payments by household expenditure. In panel 2, individual tax incidence is calculated by dividing imputed tax payments (apportioned according to individual landholdings) by per capita expenditure. The imputation of individual incidence requires the land area, but because there are households for which that is missing, the sample size of male respondents is less than that of male-headed households.

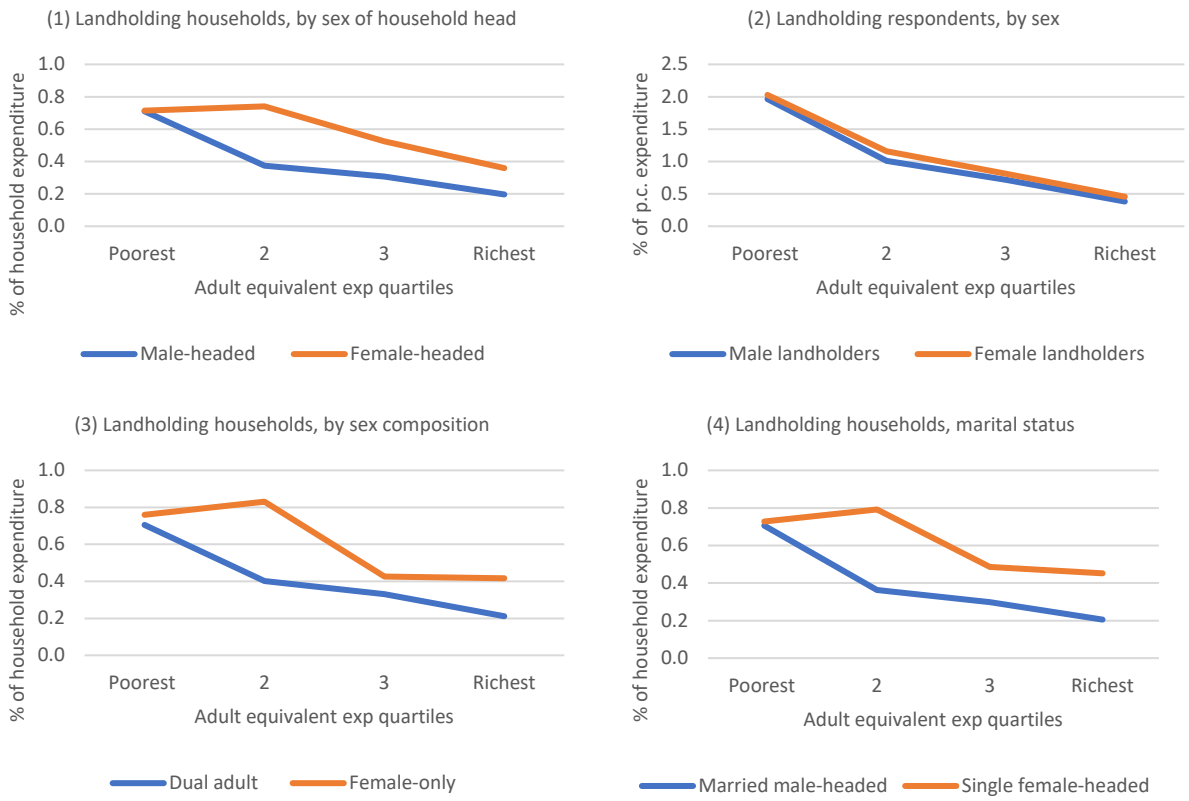
Households and individuals are ranked by adult equivalence expenditure scales into quartiles.

Tests of equality of means were conducted between (1) male- and female-headed households, (2) male and female landholders, (3) dual adult and female-only households, and (4) single female-headed and married male-headed households. Significant differences at $p<0.05$ are in bold.

[a] Male-adult-only households are excluded in this panel because of small sample size. [b] Single male-headed households are excluded because of small sample size. [d] The sample size is less than 100 observations. [e] The sample size is less than 50 observations.

Household sampling weights are used.

Figure 7. Tax Incidence



Notes: The figures are a graphic representation of Table 8. Households and individuals are ranked by adult equivalence expenditure scales into quartiles.

Table 9. Tax Incidence, by Land Area Held

Panel 1

Household tax incidence

Total land area (ha)	Male-headed	Female-headed
<0.5	**0.32**	**0.54**
0.5-0.99	**0.48**	**0.81**
1-1.99	0.56	0.57[d]
>2	0.65	na [b]
Number of households	*1,711*	*550*

Panel 2

Imputed individual-level tax incidence

Total land area (ha)	Male holders	Female holders
<0.5	**0.87**	**0.98**
0.5-0.99	**1.30**	**1.55**
1-1.99	2.18	1.89
>2	na [b]	na [b]
Number of respondents	*1,726*	*1,731*

Panel 3[a]

Household tax incidence

Total land area (ha)	Dual-adult	Female-only
<0.5	**0.36**	**0.53**
0.5-0.99	0.49	na [c]
1-1.99	0.55	na [c]
>2	0.66	na [c]
Number of households	*1,891*	*301*

Panel 4[b]

Household tax incidence

Total land area (ha)	Married male-headed	Married female-headed	Single female-headed
<0.5	**0.32**	0.54[d]	**0.54**
0.5-0.99	**0.47**	na [c]	**0.87[d]**
1-1.99	0.55	na [c]	0.61[d]
>2	0.63	na [c]	na [c]
Number of households	*1,604*	*151*	*398*

Notes: The sample is restricted to landholding households and respondents. For panels 1, 3, and 4 household tax incidence is calculated by dividing self-reported tax payments by household expenditure. In panel 2, individual tax incidence is calculated by dividing imputed tax payments (apportioned according to individual landholdings) by per capita expenditure.
Households and individuals are ranked by the area of landholdings. Tests of equality of means were conducted between (1) male- and female-headed households, between (2) male and female landholders, (3) female-only and dual adult households, and (4) married male-headed and single female-headed households. Significant differences at $p<0.05$ are reflected in bold.
[a] Male adult only households are excluded in this panel because of small sample size. [b] Single male-headed households are excluded in this panel because of small sample size. [c] The sample size is below 100 observations. [d] The sample size is below 50 observations.
Household sampling weights are used.

b) Tax Incidence Using the Amhara, Oromia, and SNNP Tax Schedules

In this section, we calculate tax incidence using imputed tax liabilities with land area and the tax schedules of Amhara, Oromia, and SNNP regions (Table 10) due to the large difference between self-reported tax payments and imputed tax liabilities found in section 4.3. The assumption is that there is full tax compliance. Our results show that tax incidence using imputed tax liabilities with land size and tax schedules is about a third of the size of tax incidence using self-reported taxes. Some patterns of the tax burden still hold, however. On vertical equity, taxes are regressive. As for horizontal equity, female-headed and female-only households still bear a larger burden than male-oriented households. Tax incidence of female-only and single female-headed households is 42 percent larger than that of dual-adult and married male-headed households—similar to the difference using self-reported taxes. For individuals, the gender difference in tax incidence is no longer significant.

Table 10. Imputed Tax Incidence Using Tax Schedules for Amhara, Oromia, and SNNP Regions

Panel 1: Imputed household tax incidence		
Expenditure quartile [a]	Male-headed	Female-headed
Poorest	0.22	0.25[b]
2	**0.13**	**0.21[b]**
3	**0.09**	**0.13[b]**
Richest	0.06	0.08[b]
Total tax incidence	**0.14**	**0.18**
Number of households	*979*	*284*

Panel 2: Imputed individual tax incidence		
Expenditure quartile [a]	Male holders	Female holders
Poorest	0.59	0.60
2	0.32	0.32
3	0.22	0.22
Richest	0.11	0.12
Total tax incidence	0.32	0.33
Number of respondents	*1,075*	*1,110*

Panel 3[c]: Imputed household-level tax incidence		
Position in expenditure distribution	Dual adult	Female-only
Bottom 40%	**0.19**	**0.26**
Top 60%	**0.09**	**0.15[b]**
Total tax incidence	**0.14**	**0.20**
Number of households	*1,058*	*172*

Panel 4[d]: Imputed household-level tax incidence		
Position in expenditure distribution	Married male-headed	Single female-headed
Bottom 40%	**0.19**	**0.26**
Top 60%	**0.09**	**0.15**
Total tax incidence	**0.14**	**0.20**
Number of households	*926*	*212*

Notes: Tax liabilities are imputed by using the area of household landholdings and the tax schedules from three regions. Household tax incidence in panels 1, 3, and 4 is calculated by dividing the imputed tax liabilities by household expenditure. The individual tax incidence is panel 2 is estimated by imputed individual tax liabilities divided by per capita expenditure. The sample is restricted to landholding households and respondents in the three regions. Tests of equality of means were conducted between (1) male- and female-headed households, (2) male and female landholders, (3) dual adult and female-only households, and (4) single female-headed and married male-headed households. Significant differences at $p<0.05$ are reflected in bold.
[a] Households and respondents are ranked by adult equivalence scale expenditure. [b] The sample size is less than 100 observations. [c] Male-adult- only households are excluded in this panel because of small sample size. [d] Single male-headed and married female-headed households are excluded in this panel because of small sample size. Household sampling weights are used.

c) Hypothetical Tax Incidence

In this section, we carry out an exercise to calculate the tax incidence of a hypothetical tax schedule that reduces per-hectare tax rates for farmers with less than 0.5 hectare of land and progressively increases the tax liabilities for larger land areas to assess how it affects vertical and horizontal equity.

We start with the tax schedule of Amhara region for *kebeles* (or wards) that are not in the Productive Safety Net Program (PSNP) because the average per-hectare tax rate is the most progressive for land that is larger than one hectare (see Figure 2), and we then increase the tax liabilities for larger landholdings. We set the agricultural income tax liability for smallholder farmers (<0.5 ha) at zero, which is consistent with the current agricultural income tax for rain-dependent farmers in Oromia (see Appendix 1). The hypothetical tax schedule outlined in Table 11 results in an average per-hectare tax rate that increases with land area (column 4), while increasing the total tax liabilities in birr (column 3) to slightly higher levels than the current schedule for Amhara region (non-PSNP *kebeles*) (column 5).

Table 11. Hypothetical Tax Schedule, Birr

					Current Amhara tax schedule (non-PSNP wards)
	(1)	(2)	(3)	(4)	(5)
Land area (hectare)	Rural land use fee	Agricultural income tax	Total tax liabilities	Average per hectare tax rate	Existing Amhara tax schedule: Total tax
<0.5	15	0	15	60.0	40
0.5–1	20	30	50	66.7	55
1–1.5	30	55	85	68.0	75
1.5–2	40	80	120	68.6	100
2–2.5	50	105	155	68.9	130
2.5–3	60	130	190	69.1	170
3–3.5	70	155	225	69.2	210
3.5–4	85	180	265	70.7	250
4–4.5	100	205	305	71.8	290
4.5–5	115	230	345	72.6	330

Notes: Columns 1–3 provide a hypothetical tax schedule that exempts from agricultural income tax smallholders with less than 0.5 ha and increases the progressivity of the tax schedule. The average per hectare tax rate in column 4 is calculated by dividing the total tax by the midpoint of the landholding classes. Column 5 provides the existing tax schedule for non-PSNP wards in Amhara region.

Using the total tax liabilities in column 3, and household and respondent landholding areas, we calculate the hypothetical tax incidence (Table 12). We assume full tax compliance and no behavioral responses to the changes. The results show that there is no longer a gender difference in tax incidence because the tax liabilities for total landholdings of less than 0.5 ha are lower. Female-only households continue to bear a larger tax burden than dual-adult households in the second quartile but the magnitude of the difference is smaller than when self-reported taxes are used. The taxes continue to be regressive because the average landholding area does not vary across the expenditure distribution. This illustrates how difficult it is for area-based land taxes to be vertically equitable, particularly where land rights are prevalent among poor rural households, and because these taxes are not always correlated with property values and agricultural income (Bird and Slack 2005; Khan 2001; Norregaard 2013; Skinner 1991; Sah and Stiglitz 1985).

Table 12. Hypothetical Tax Incidence

Panel 1

Household tax incidence

Expenditure quartile	Male-headed	Female-headed
Poorest	0.27	0.25
2	0.16	0.21
3	0.11	0.13
Richest	0.08	0.09
Total tax incidence	0.18	0.18
Number of households	*1,740*	*556*

Panel 2

Imputed individual tax incidence

Expenditure quartile	Male holders	Female holders
Poorest	0.77	0.75
2	0.40	0.38
3	0.28	0.27
Richest	0.16	0.16
Total tax incidence	0.42	0.41
Number of respondents	*1,763*	*1,754*

Panel 3[a]

Household tax incidence

Expenditure quartile	Dual adults	Female-only
Poorest	0.27	0.26[c]
2	**0.15**	**0.25[c]**
3	0.11	0.14[c]
Richest	0.08	0.07[c]
Total tax incidence	0.17	0.20
Number of households	*1,923*	*303*

Panel 4[b]

Household tax incidence

Expenditure quartile	Married male-headed	Married female-headed	Single female-headed
Poorest	0.27	0.25[c]	0.25
2	**0.15**	na	**0.24**
3	0.11	na	0.14[c]
Richest	0.08	na	0.10[c]
Total tax incidence	0.17%	0.15%	0.2
Number of households	*1,630*	*153*	*402*

Notes: The sample is restricted to landholding households and respondents. Tax incidence is calculated by dividing by household expenditures the imputed tax liabilities using land area and the hypothetical tax schedule in Table 11. Tests of equality of means were conducted between (1) male- and female-headed households, (2) male and female landholders, (3) dual-adult and female-only households, and (4) single female-headed and married male-headed households. Significant differences at $p<0.05$ are reflected in bold. [a] Male-adult-only households are excluded in this panel because of small sample size. [b] Single male-headed households are excluded in this panel because of small sample size. [c] The sample size is less than 100 observations. Household sampling weights are used.

5. Summary and Conclusion

We present evidence of the gender implications of the tax incidence of the rural land use fee and agricultural income tax in Ethiopia. Close to 80 percent of landholding households and 84 percent of households with formal land rights pay these taxes. Rural landholders may view tax payment as a proxy for having a title to land to ensure continuation of their rights in an environment of tenure insecurity. The taxes are regressive, violating the vertical equity principle. Female-headed- and female-only households face a larger tax burden than their male counterparts, which violates the horizontal equity principle. These gender differences persist when we impute tax incidence with total land area and regional tax schedules. An area-based land tax is implicitly gender-biased because norms about women's roles in agriculture, the structure of households, and the gender agricultural productivity gap result in higher tax burdens for women than for men. A more progressive per-hectare tax schedule with exemptions for smallholders from paying agricultural income tax would reduce the tax burdens for women, but it would continue to be regressive.

We also found a substantial difference between self-reported tax payments and tax liabilities imputed based on land area and the tax schedules. The discrepancies in reported tax payments and estimated tax liabilities point to the importance of administrative tax data and land registries to complement survey data so as to ensure that

taxes are assessed on the most current landholder information and landholding area. This would allow for analysis of the degree of landholder tax compliance and any over- or underpayment.

There has been an increasing focus on the potential of property taxes to raise local government revenue and reduce the need for inter-governmental fiscal transfers (Franzsen and McClosky 2017; Junquera-Varela et al. 2017). Area-based land taxes are also economically more efficient, easier to administer, and cost less than value-based property taxes (Slack and Bird 2014), particularly when there are no well-developed and well-functioning rural land markets (Sah and Stiglitz 1985; Skinner 1991). However, it is important to ensure that area-based land taxation is consistent with the principles of vertical and horizontal equity.

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Appendix 1. Tax Schedules for the Rural Land Use Fee and Agricultural Income Tax, Amhara, Oromia, and SNNP Regions, Birr

	Amhara – PSNP *Kebeles*		Amhara – non-PSNP *Kebeles*		Oromia			SNNP		
Landholding (hectare)	**Land use fee**	**Ag income tax**	**Land use fee**	**Ag income tax**	**Land use fee**	**Ag income tax for rain-dependent farmers**	**Ag income tax for rain and irrigation farmers**	**Land use fee**	**Ag income tax**	**Ag income tax for banana, coffee, chat, apple, and pepper plantations**
<0.5	10	20	15	25	15	0	30	10	10	15
0.5–1	15	30	20	35	20	20	40	15	15	20
1–1.5	20	40	25	50	30	35	55	20	20	25
1.5–2	25	55	30	70				25	25	30
2–2.5	30	75	35	95	45	55	75	30	30	35
2.5–3	35	105	40	130				35	35	40
3–3.5	50	130	55	155	65	70	90	45	45	50
3.5–4	65	155	70	180						
4–4.5	80	180	85	205	90	100	120	55	55	60
4.5–5	95	205	100	230						
5–5.5	110	230	115	255	120	140	160	70	70	75
5.5–6	125	255	130	280						
6–6.5	140	280	145	305				85	85	90
6.5–7	155	305	160	330						

Source: Amhara Regional State, Proclamation (No.161/2001), Proclamation to Amend Rural Land Use Payment and Agricultural Income Tax of Oromia Regional State's Proclamation (No.99/2005), SNNP Regional State, A Revised Proclamation to provide for rural land use fee and agricultural activities income tax (No. 122/2008).

Appendix 2. Number of Households and Respondents per Region

	Number of Households	Number of Male Respondents	Number of Female Respondents
Tigray	390	424	472
Afar	298	286	322
Amhara	479	498	558
Oromia	451	495	495
Somali	351	387	395
Benishangul Gumuz	168	190	194
SNNP	422	434	498
Gambela	195	213	217
Harar	188	195	199
Total	*2,942*	*3,122*	*3,350*

Notes: (1) We dropped households with no adults (4 households); those that did not respond to the question on whether they paid these taxes (6 households); and households that were not administered the individual-level asset module (3 households).
(2) The sample excludes Dire Dawa region because it is governed by a city administration, and rural land use fee and agricultural income tax are not collected in urban areas.

Appendix 3. Construction of Agricultural Landholder Variables from Survey Responses

Variable	Definition	Questions in Survey
Agricultural land	Agricultural land is defined as plots that were used for agriculture in the previous 12 months.	Yes to the question, *"In the last 12 months, has this parcel been used for agriculture?"*
Landholding household	Households are landholders if at least one plot was granted to the household by leaders, was inherited, or was purchased.	"*How was this parcel acquired?*" If yes to one of the following for at least one parcel: granted to the household by leaders, was inherited, or was purchased (in the household module or post-planting module).
Documented landholding household	Households are documented landholders if they have a title deed, certificate of ownership or hereditary acquisition, or purchase agreement for at least one plot.	"*What type of documents does your household have for this parcel?*" If yes to one of the following for at least one parcel: title deed, certificate of ownership or customary ownership, certificate of occupancy or hereditary acquisition, or purchase agreement (in the individual land roster module or the post-planting module).
Individual landholder (self-reported)	An individual is a landholder if he or she has the right to use at least one plot. *and* The plot was granted to the household by leaders, was inherited, or was purchased. An individual who rents or sharecrops a plot is not its landholder.	If yes the question, "Do you hold use rights for this parcel either alone or jointly with someone else?" (in the individual land roster module). *and* "*How was this parcel acquired?"* If yes to one of the following for at least one parcel: granted to the household by leaders, was inherited, or was purchased (in the individual land roster module).
Individual documented landholder (self-reported)	Individuals are documented landholder if their name is on the title deed, certificate of ownership, or hereditary acquisition for at least one plot in the LSMS-plus module.	*"What type of documents does your household have for this parcel?"* If yes to one of the following for at least one parcel: title deed, certificate of ownership or customary ownership, certificate of occupancy, hereditary acquisition, or purchase

		agreement (in the individual land roster module). *and* If yes to the question, *"Is your name among the names listed on the ownership document?"* (in the individual land roster module).

Appendix 4. Individual Characteristics, All Respondents in Rural Households

	Men	Women
Age (years)	**38.6**	**37.1**
% of respondents in female-headed households	**8.8%**	**23.7%**
Marital status		
Married	71.0%	70.8%
Relationship to household head		
Head of household	**71.1%**	**19.4%**
Spouse of head	**1.3%**	**63.4%**
Son/daughter of head	**25.0%**	**11.5%**
Other	**2.7%**	**5.8%**
Number of respondents	*3,122*	*3,350*

Notes: Tests of equality of means were conducted between male and female respondents. Significant differences at $p<0.05$ are reflected in bold. Household sampling weights are used.

Appendix 5. Household Characteristics by Head's Marital Status

	Married male-headed	Single male-headed	Married female-headed	Single female-headed
Household characteristics				
Age of household head	**44.4**	45.8	39.2	**49.8**
Household size	**5.4**	3.0	4.4	**3.3**
Adult son of head lives in household	**23.8%**	20.4%	17.8%	**34.3%**
Household receives cash or in-kind transfers from family or friends	**8.6%**	11.3%	23.7%	**17.2%**
Total annual household expenditure (Birr)	**49,827.4**	35,520.1	42,976.8	**34,837.1**
Percentage of households engaged in subsistence farming	23.4%	27.2%	28.3%	29.8%
Number of households	*1,999*	*158*	*262*	*522*
Households that rent out or sharecrop agricultural land[a]				
=1 if rent out or sharecrop land	**10.0%**	16.3%	8.5%	**21.1%**
Number of households	*1,889*	*152*	*242*	*511*
Crop farming households that received extension services				
Received extension services	**40.9%**	30.0%	29.9%	**32.8%**
Number of crop-farming households	*1,577*	*105*	*125*	*340*

Notes:
Test of equality of means was conducted between married male-headed- and single female-headed households. Significant differences at $p<0.05$ are reflected in bold.
[a] This indicator is missing for some households, including Somali region because the post-planting module was not administered due to security concerns. Non-landholding households are classified as not being able to rent out land. Household sampling weights are used.

Appendix 6. Respondents with Landholding Rights by Sex and Region, Percent

	=1 if landholder		=1 if documented landholder		
	Men	Women	Men	Women	Number of respondents
All rural	**73.2**	**70.0**	**54.6**	**47.7**	*6,472*
By region					
Tigray	53.9	54.0	44.8	43.8	896
Afar	8.9	8.1	2.5	2.0	608
Amhara	70.5	71.9	62.7	62.1	1,056
Oromia	**80.3**	**75.8**	**56.0**	**42.3**	990
Somali	**33.3**	**18.1**	3.9	2.1	782
Beninshangul Gumuz	58.0	54.5	44.5	34.7	384
SNNP	**82.3**	**76.9**	**59.4**	**52.4**	932
Gambela	61.0	55.5	22.6	15.2	430
Hareri	71.4	59.6	**47.7**	**31.7**	394
Number of respondents	*3,122*	*3,350*	*3,122*	*3,350*	*6,472*

Notes: Tests of equality of means were conducted between male- and female respondents. Significant differences at $p<0.05$ are reflected in bold.
Household sampling weights are used.

Appendix 7. Predicting Joint or Exclusive Landholding

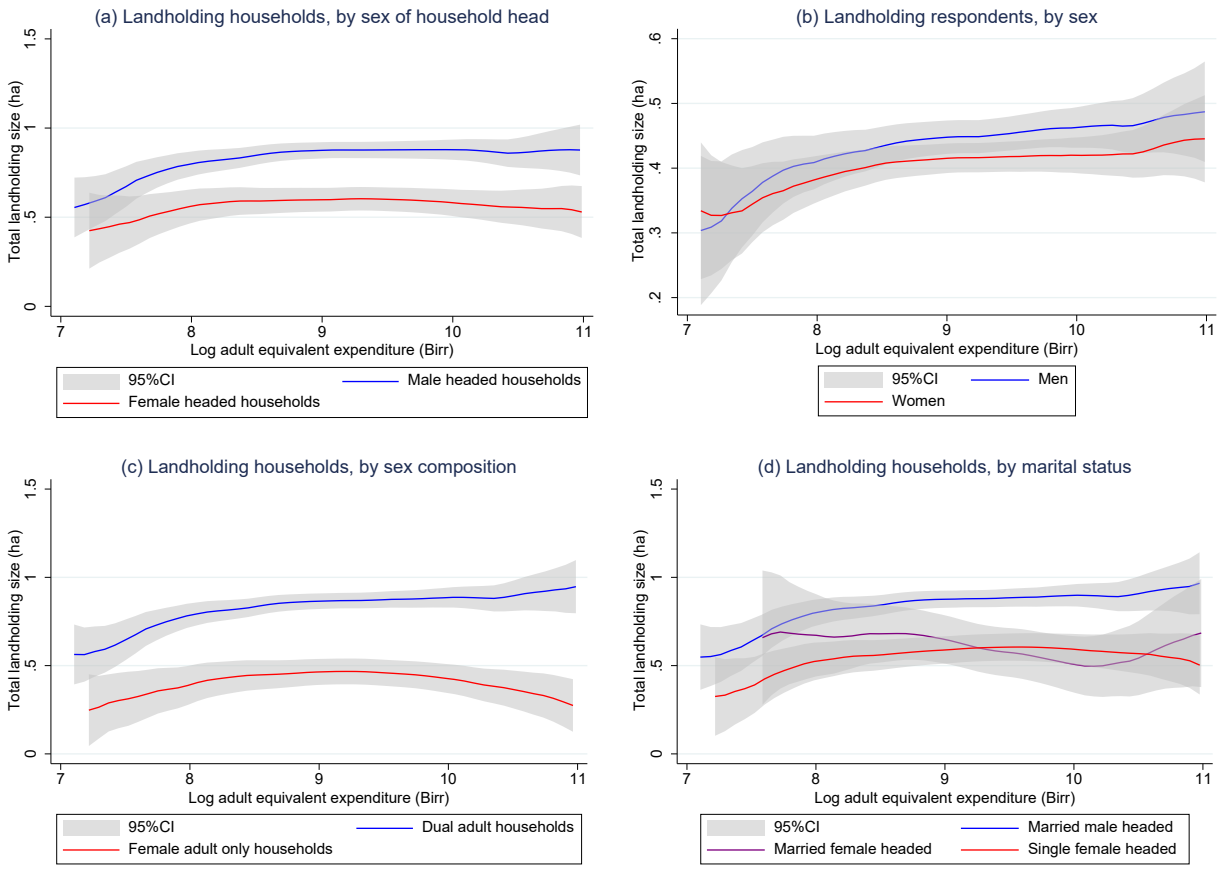
We predict the probability that a landholding respondent holds land exclusively or jointly using a linear probability model by OLS (Table A7). We find that women living in female-headed households are less likely to be joint holders but they are significantly more likely if an adult son lives in the household. The coefficient for the adult daughter lives in the household is only marginally significant at 10 percent. This is likely so because older sons tend to be given preference in inheriting land rights and women then hold land rights jointly with them (Bezu and Holden 2014b; Kosec et al. 2018).

Table A7. Prediction of Exclusive or Joint Landholding by Sex of Respondent

	Exclusive Landholder		Joint landholder	
	(1)	(2)	(3)	(4)
	Men	Women	Men	Women
Adult daughter lives in HH	-0.007	-0.009	0.024	0.005
	(0.038)	(0.032)	(0.029)	(0.024)
Adult son lives in HH	-0.043	0.013	0.019	-0.007
	(0.034)	(0.025)	(0.023)	(0.019)
Adult son in HH * adult daughter in HH	-0.063	-0.065**	0.019	0.031
	(0.041)	(0.027)	(0.032)	(0.024)
Respondent in female-headed household	0.120	0.251***	-0.082	-0.293***
	(0.095)	(0.076)	(0.088)	(0.080)
Respondent in female-headed household * adult daughter in HH	0.345	0.048	-0.378*	0.119*
	(0.236)	(0.074)	(0.226)	(0.069)
Respondent in female-headed household * adult son in HH	0.022	-0.176**	0.005	0.164**
	(0.057)	(0.079)	(0.047)	(0.079)
Respondent in female-headed household * adult son in HH * adult daughter in HH	-0.057	-0.097	0.128**	0.120*
	(0.082)	(0.083)	(0.059)	(0.071)
Constant	0.185*	0.273**	0.837***	0.745***
	(0.108)	(0.117)	(0.097)	(0.121)
Observations	1,848	1,821	1,848	1,821
R-squared	0.181	0.515	0.229	0.553

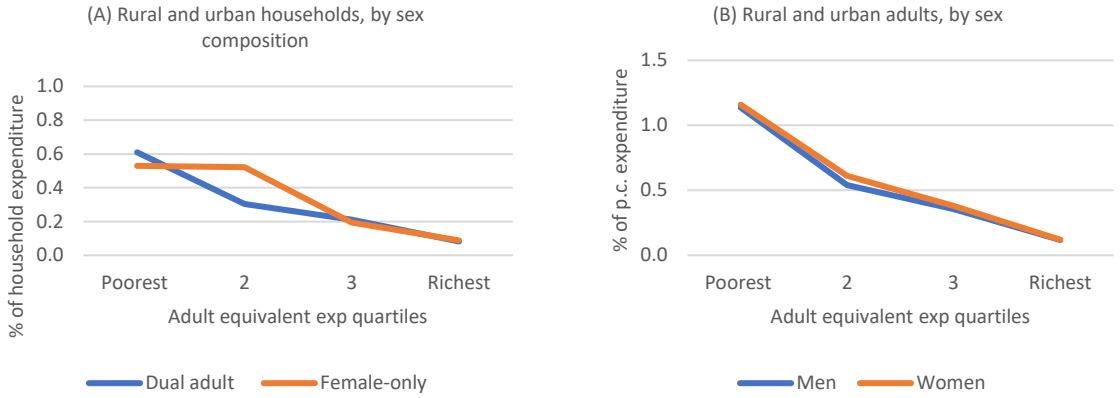
Notes: The results show the probability of being an exclusive landholder (columns 1 and 2) or a joint landholder (columns 3 and 4) from the linear probability model using an OLS for landholders. The regressions include the following variables not shown in the table: household size, religion and marital status of the household head, whether the household received remittances, whether the household engaged in subsistence farming, the respondents' age, education, and relation to the household head, housing assets, household ownership of livestock, whether the household has documented title, and dummy variables indicating regions. Standard errors are clustered by enumeration area. *** significant at <1%, ** significant at <5%, * significant at <10%.

Appendix 8. Total Area of Agricultural Land held by Households and Respondents, by Expenditure Distribution[a]



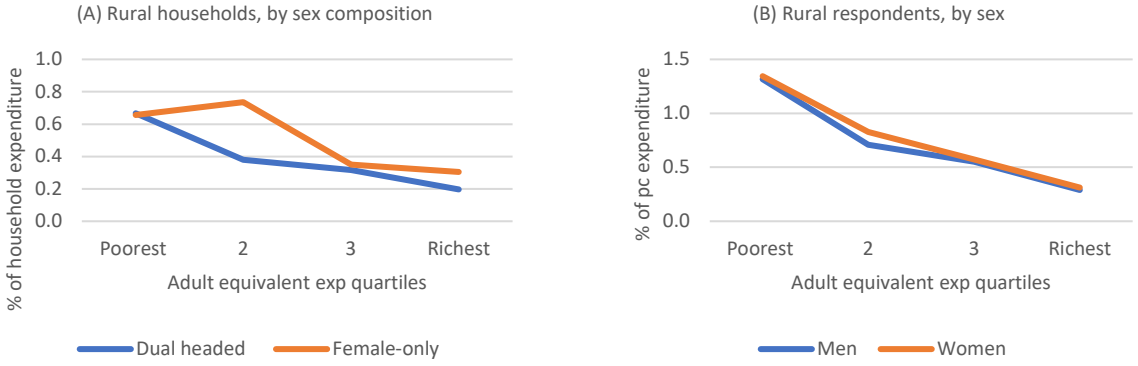
Notes: These panels present the local polynomial regressions of land area on the log of the adult equivalent expenditure. The shaded area shows the 95 percent confidence interval. Top and bottom 1% of farm area values are dropped. Household sampling weights are used.

Appendix 9A. Tax Incidence for All Rural and Urban Households



Notes: Household tax incidence in panel A is calculated by dividing self-reported tax payments by expenditures for all households, rural and urban. Individual tax incidence in panel B is calculated by dividing imputed tax payments (apportioned according to individual landholdings) by per capita expenditures for all adults. Households and adults with no rural agricultural landholdings pay no tax. Household sampling weights are used.

Appendix 9B. Tax Incidence for all Rural Households



Notes: Household tax incidence in panel A is calculated by dividing self-reported tax payments by household expenditures. Individual tax incidence in panel B is calculated by dividing imputed tax payments (apportioned according to individual landholdings) by per capita expenditures. Households and respondents with no rural agricultural landholdings pay no tax. Household sampling weights are used.