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Decomposition of Gender Differentials in Agricultural Productivity in Ethiopia

Arturo Aguilar
Eliana Carranza
Markus Goldstein
Talip Kilic
Gbemisola Oseni

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Abstract

This paper employs decomposition methods to analyze differences in agricultural productivity between male and female land managers in Ethiopia. It employs data from the 2011–2012 Ethiopian Rural Socioeconomic Survey. An overall 23.4 percent gender differential in agricultural productivity is estimated at the mean in favor of male land managers, of which 10.1 percentage points are explained by differences in land manager characteristics, land attributes, and unequal access to resources (the endowment effect). The remaining 13.4 percentage points are explained by unequal returns to productive components, but cannot be easily tied to specific covariates. These results are mainly driven by non-married female managers (mainly single and divorced). Married female managers do not display such disadvantages. Further analysis along the productivity distribution reveals that gender differentials are more pronounced at mid-levels of productivity and that the share of the gender gap explained by the endowment effect declines as productivity increases. Detailed decomposition of estimates at selected points of the agricultural productivity distribution provides valuable information for policy intervention purposes.

This paper is a product of the Poverty Reduction and Economic Management Unit, Africa Region. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at arturo.aguilar@itam.mx.

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Arturo Aguilar

Eliana Carranza

Markus Goldstein

Talip Kilic

Gbemisola Oseni

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All authors work for the World Bank with the exception of Arturo Aguilar, who is Assistant Professor of Economics at ITAM. Correspondence regarding this paper can be sent to Arturo Aguilar: arturo.aguilar@itam.mx. This report was prepared under supervision of Task Team Leaders Eliana Carranza and Eyasu Tsehaye. We gratefully acknowledge comments from Daniel Ayalew Ali, Aparajita Goyal and Dean Mitchell Jolliffe. Federico Kochen provided excellent research assistance. This paper is a product of the Poverty Reduction and Economic Management Unit, Africa Region.

1 Introduction

Agricultural productivity, in general, is low in many Sub-Saharan African countries where most farmers are smallholders, but even lower for female farmers compared to their male counterparts. Studies have persistently identified a gender gap in agricultural productivity of 20 to 30 percentage points in disadvantage of women as an important barrier for the development of the agricultural sector. A number of these studies indicate that once differences in access to productive resources and individual characteristics are taken into account, estimates of the gender productivity gap become insignificant. Henceforth, the evidence speaks of a difference in productivity that arises mainly from differential access to resources and differential farmers' characteristics by gender. Nevertheless, conclusions based on prevailing evidence are limited by the studies' (i) country and crop-specificity of findings; (ii) methodological and data constraints; and (iii) neglect of distributional statistics beyond the mean (Moock 1976; Saito et al. 1994; Udry 1996; Quisumbing et al 2001; Tiruneh et al. 2001; Gilbert et al. 2002; Akresh 2005; Oladeebo and Fajuyigbe 2007; Alene et al. 2008; Goldstein and Udry 2008; Vargas Hill and Vigneri 2009; Kinkingninhoun-Medagbe et al. 2010; Kilic et al. 2013).[1]

This paper contributes to the gender inequality literature[2] by providing recent evidence of agricultural productivity differences and solves some of the limitations described above. Following the classical approach of the gender wage differences literature, decomposition methods are used to determine to what extent the differences in productivity are explained by: (i) gender disparity in the levels of determinants of production (e.g. differential access to productive inputs, technology, training, or individual characteristics of land managers); and/or (ii) gender inequality in the returns of those determinants.

Ethiopia's latest figures in terms of economic growth, recent policy reforms in the agricultural sector and regional heterogeneity make it a relevant and interesting country to study. Its economy relies heavily on agriculture with close to 80 percent of employment and 46 percent of GDP concentrated in this sector.[3] The certification of usufruct rights has been recently implemented with the purpose to increase tenure security, generate incentives to invest, and boost productivity (Deininger et al., 2007). However, similar to most Sub-Saharan countries, its agricultural sector has low levels of technology development (e.g. fertilizer use, irrigation) and relies on smallholder production. Therefore, the analysis of factors that explain differences in gender productivity might have interesting policy implications for other countries in the region.

The only previous work similar to this paper in the Ethiopian context finds a 26 percent productivity[4] disadvantage for agricultural production of female-headed households. It concludes that the difference in productivity is mostly explained by lower access to inputs. In particular, if female-headed households had used the average amounts of inputs employed by male-headed households, their estimations would predict a 1.3 percent higher productivity for female-headed

[1] See Peterman et al. (2011), World Bank (2012, table 5.1), and Kilic et al. (2013) for a comprehensive review of the evidence.
[2] The related literature on wage gender gaps consistently reports that the wage differences have been steadily declining, but are still present. Improved female access to education, health, child-care arrangements, and access to training are examples of drivers that explain improved female labor participation and reductions in gender wage gaps (Hundley 2000; Hersch and Stratton 2002; World Bank 2012).
[3] Source: http://data.worldbank.org/country/ethiopia
[4] Tiruneh et al. (2001) measure productivity as the value of output per hectare, which is the same approach to be considered in the present study.

households (Tiruneh et al. 2001). Nonetheless, the paper uses a very limited geographical sample for the study.

The data set used in this paper corresponds to the first wave of the Ethiopia Rural Socioeconomic Survey (ERSS) conducted in 2011-2012. This survey is representative at the national level and for the four largest regions (Amhara, Oromiya, SNNP and Tigray). The survey includes data from the post-planting and post-harvest periods of the main agricultural season.[5] Data are available at the field level. For each field, the survey asks the household to identify the person within the household in charge of the management and decision making of every piece of agricultural land (henceforth, the *manager*). This paper will analyze differences in productivity by gender of the manager.

The methodology followed in this paper employs decomposition methods. First, the traditional Oaxaca-Blinder technique (henceforth OB decomposition) employed in the gender wage gap literature is used to estimate: (i) the proportion of the gender productivity gap that results from differential characteristics of managers, land, and unequal access to productive inputs (*endowment effect*); and (ii) the proportion that results from unequal returns to the previous components (*structure effect*) (Oaxaca 1973; Blinder 1973). This method provides also a detailed decomposition, which is very useful from a policy perspective since it allows identifying the main drivers that explain the gender differences in productivity. Then, Recentered Influence Function (RIF) regressions proposed by Firpo et al. (2009) are used to identify differences of the previous results along the productivity distribution.

An overall gender difference in productivity of 23.4 percent favoring men is found, of which 10.1 percentage points (43 percent) corresponds to the endowment effect. On average, female managers manage smaller plots, use less non-labor inputs (e.g. livestock and tools), regularly spend less time in agricultural-related activities, are less likely to use rented fields to produce, and inhabit smaller households with lower average income. These components are the main contributors to explain the endowment effect. Regarding the structural effect, the main covariates that display unequal returns by manager's gender are the access to extension services, fields' distance to the household, agricultural non-labor input use (e.g. chemical fertilizer and livestock use), land characteristics (e.g. size and number of plots managed), product diversification, and years of schooling. Moreover, female managers are also 1 percentage point more likely to leave their land holdings fallow, even after controlling for manager, land and household's characteristics.

A heterogeneity analysis by marital status shows that most of the difference results from the disadvantage among non-married female managers, who on average are 30.2 percent less productive than the average male. Most of this difference (80 percent) corresponds to the structural effect (i.e. remains after controlling for a set of covariates). Within non-married females, single females are the most disadvantaged, followed by those divorced.

The largest gender gaps are observed in the middle of the productivity distribution while we observe the lowest differences at the left extreme of the distribution. The proportion explained by the endowment effect peaks at the bottom of the distribution. Meanwhile, the middle and top of the distribution do not display a consistent trend in the endowment effects. At this part of the

[5] There are two agricultural seasons in Ethiopia: the *Meher* and *Belg.* The *Meher* is the main crop season. Area cultivated and crop production in the *Meher* season accounted for 92.1 percent of total area cultivated and 96.9 percent of total crop production during the 2007-2008 seasons (Taffesse et al. 2012).

distribution, the increasing and then decreasing gender inequality is mainly driven by the structural effect.

The remainder of the paper is organized as follows: *Section 2* provides brief context information about Ethiopia; *Section 3* describes the data set employed; *Section 4* details the decomposition methods employed in the empirical estimations; *Section 5* presents the results; *Section 6* performs some robustness checks; and finally, *Section 7* concludes.

2 The Ethiopian context and recent agricultural development[6]

Ethiopia is Africa's second most populated country with 85 million inhabitants distributed along a 1 million square kilometers land-locked area. Its economy is highly dependent on agriculture. The most recent figures indicate that agriculture contributes 46.3 percent to Ethiopia's Gross Domestic Product (GDP) and that around 82.9 percent of the population lives in rural areas. Last decade's growing trends in crop production and yields[7] provide a hopeful message to the more than 30 percent of rural population living below the national poverty line (see Figure A.1).

Ethiopia's agriculture is complex since it involves substantial variations in crops grown across the country's different regions and ecologies (Taffesse et al. 2012). In Ethiopia there is no single main staple crop, instead five cereals dominate production: teff,[8] wheat, maize, sorghum and barley, which account for about three-quarters of total cultivated area,[9] and 29 percent of agricultural GDP. After cereals, pulse and oilseed are the second and third most cultivated crop groups. Coffee is the major cash and export crop, accounting for 3.8 percent of GDP and only 2.7 percent of total area cultivated.

The majority of farmers consists of smallholder peasants and produces mostly cereals for self-consumption. Access to irrigation, modern technologies, and inputs is limited. By 2007-2008, smallholder farmers cultivated 12 million hectares of land, which represents 96.3 percent of the total cultivated area (Taffesse et al. 2012). Even though there have been recent improvements, poverty alleviation and food security are still key challenges. By 2011, the population living on less than $1.25 and $2.00 dollars per day was 30.6 and 66 percent, respectively. Child malnutrition in 2011, measured as the percentage of children under age 5, remains high, at 29.2 percent. Enhancing sustained increases in agriculture productivity, and promoting gender equality[10] may be the next step for further poverty alleviation and food security attainment, especially for rural Ethiopian households.

[6] Unless otherwise stated, the statistics reported were obtained from http://data.worldbank.org/country/ethiopia

[7] Taffesse et al. (2012) documented that the increase of production in the past decade has been mostly due to increases in the area cultivated. Cereal yields have increased at an average rate of 4 percent during the last decade. Still, yield levels are low compared to international standards.

[8] Teff is an indigenous crop widely grown only in Ethiopia and Eritrea.

[9] Between 2004/05 – 2007/08, on average, teff accounted for 29 percent, maize 21 percent, sorghum and wheat 19 percent, each, and barley 12 percent from the total cereal cultivated area (Taffesse et al. 2012).

[10] Tiruneh et al. (2001) documented that female households were almost 28 percent less productive, in terms of value per hectare, than male, in Ethiopia's central highlands area. This gender difference was mainly explained by differences in inputs, such as farm size, livestock, and use of inorganic fertilizer, among others.

Administratively, Ethiopia is divided into 11 regions largely based on ethnic group segregation.[11] Each region is administratively subdivided into zones, *woredas* (districts) and *kebeles.*

Government development strategy has been lately geared toward smallholder agriculture. Recent policy changes have been focused to promote: (i) the liberalization of agricultural markets, (ii) investment in transportation infrastructure, and (iii) agricultural research and extension. Some of the most important government-related programs that have impacted agricultural development include the Productive Safety Net Program[12] and the Land Certification Program.[13] The latter issues land-use certificates to increase security in the access to land.

Nonetheless, this economic liberalization did not mean complete withdrawal of the government from markets. Seed and fertilizer markets are still subject to government intervention (Dorosh and Radish 2012). Land remains stated-owned with strong restrictions on transfers and rentals. Evidence suggests that the Land Certification Program had a positive effect on investment and soil conservation, and it can be a step toward a broader process of land policy reform (Deininger et al., 2007).

Women's participation in agriculture varies by region, product and task performed. For instance, weeding is generally considered "women's work" and, depending on the region, cultural norms sometimes restrict women's participation in other productive activities. Female roles make them more likely to cultivate vegetable crops on small plots located close to their homes. Marketing and decisions over the revenues are usually taken by the household head, who tends to be male. The difference in roles played by males and females, added to cultural norms, usually restrict women's access to extension services. Recently, the government has made efforts to improve women's access to agricultural services, mainly extension and credit (World Bank and IFPRI 2010). Finally, rights to access land could sometimes be gender biased but this differs by region. Furthermore, women are usually left vulnerable upon dissolution of marriage and seldom keep land rights (Fafchamps and Quisumbing 2005).

3 Data

The empirical analysis uses data from the first wave of the Ethiopia Rural Socioeconomic Survey (ERSS) conducted in 2011-2012.[14] The ERSS is modeled after the common Living Standards Measurement Study (LSMS) surveys with a total sample of 3,969 households. The sample is representative at the national and rural/small town levels. It is also representative at the regional level for the four largest regions: Amhara, Tigray, Oromia and SNNP. Of the total sample, 1,518

[11] See Tronvoll and Hagmann (2012) for a review of Ethiopia's particular "ethnic federalism" and the relation of traditional authorities with Ethiopia's now-a-days political organization.
[12] The Productive Safety Net Program is a food-for-work program. It provides cash transfers to individuals in exchange for labor in public works. As a result, infrastructure development (e.g. building of roads) benefited from the program.
[13] These policy developments have contributed to major increases in national food production and enhanced food security (Dorosh and Radish 2012).
[14] The ERSS survey was collected by the Ethiopia Central Statistics Agency (CSA) in collaboration with the World Bank Living Standard Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA) team.

managers are considered for the analysis, of which 1,277 are male (84.1 percent) and 241 are female (15.9 percent).[15]

Households were visited at three points in time: (i) the first visit (post-planting) occurred in September and October 2011 to gather information on planting activities; (ii) the second visit occurred in November 2011 to collect information on livestock activities; and (iii) the final visit (post-harvest) occurred in February and March 2012 to gather information on harvest activities and production. The household and community questionnaires were also administered during the third visit. For agricultural households, detailed data were collected on crops grown, land size, inputs, production, yields (on selected crops) and other plot characteristics.

The empirical analysis presented here is done at the manager level. Broadly speaking, the manager is an individual within the household in charge of the management and decision making of a given piece of land – the *parcel*.[16] The agricultural survey asks each manager to report the final use given to their agricultural production on a crop-by-crop basis. Using that information, a productivity measure[17] is generated by calculating the value of production per hectare during the last agricultural season. Gender differences in productivity will be estimated using this measure. Additional covariates that might explain different levels of productivity, including manager characteristics, labor and non-labor inputs, and land characteristics will be added to the analysis.

Table 1 provides some descriptive statistics of the variables to be included in the empirical analysis. Also, it gives an initial idea of the differences in productivity (unconditional difference), showing that female managers are 23 percent less productive on average than male managers (difference significant at the 1 percent level). In addition, Table 1 contains information about individual characteristics, access to resources (e.g. labor, technology, agricultural inputs) and land characteristics.

Based on information from Table 1, the following individual attributes differentiate female and male managers:[18] (i) female managers are 4.4 percentage points less likely to be household heads (99 percent of male managers and 95 percent of female managers are household heads); (ii) female managers are 70 percentage points less likely to be married, which reflects that the majority of female managers are widowed (60 percent) or divorced (12.4 percent); (iii) female managers

[15] The sample contains 3,198 managers (2,521 males and 677 females). Of those, 2,388 report some production: 1,969 males (82.5 percent), 419 females (17.5 percent). Those observations with productivity above the 99th percentile or below the 1st percentile are excluded, leaving 2,340 observations. Finally, 822 observations are excluded for not having information available for some covariates to be included in the analysis. This yields the final 1,518 manager dataset. Table A.1 in the Appendix illustrates the selection patterns in terms of observables that result from the three different restrictions imposed on managers: (i) ability to estimate productivity, (ii) excluding outliers, and (iii) covariates availability. The strongest restriction –measured by proportion of covariates with significant differences between managers excluded and those that remain in the sample– is the ability to estimate productivity, followed by covariate availability and removing outliers. Managers with smaller managed land size are left out of the sample. Small differences in labor and non-labor inputs are observed between managers excluded and those remaining in the sample. The restrictions are more distorting for male managers.

[16] Each parcel is subdivided into fields, which are the most disaggregated unit of land identified in the dataset. The agricultural survey has information about each of the crops planted on each field.

[17] Productivity is measured as the sum of the total value of production divided by the total size (in hectares) of land managed. Appendix 1 gives a detailed explanation of how the production variable (in kilograms) is estimated based on the questions from the ERSS survey's crop disposition section. To determine the value of production, prices of each product are required. The prices are estimated using manager's self-reported information for sales. The median price is computed at an EA-product basis. If less than 10 observations for a given product at a given Enumeration Area (EA) are obtained, the price is estimated at the next geographical level in terms of aggregation. The purpose is to use the most disaggregated geographical level for which at least 10 observations of the sale price are available. The geographical units from less to more disaggregated are: nation, region, zone, *woreda*, *kebele*, and EA.

[18] The significantly different characteristics will be highlighted in the section. However, Table 1 contains a more comprehensive set of variables that characterize female and male managers.

complete 1.3 less years of schooling; (iv) female managers are 6.7 percentage points less likely to have access to credit services; and (v) female managers spend 8.5 fewer hours a week on agricultural activities (male managers spend 23 hours on average, while females spend 14.4).

With respect to field characteristics, Table 1 indicates that: (i) females manage fewer fields and smaller lands (females manage, on average, 11.9 fields and 1.1 hectares, while males control, on average, 13.2 fields and 1.4 hectares); (ii) males are more diversified in their production in terms of number of different products planted and likelihood of practicing intercropping[19] (on average, males plant 7.5 different crops and practice intercropping on 25 percent of their fields, while females plant 6.8 different crops and intercrop in 20.9 percent of their fields); (iii) males are more likely to have fruit bearing trees among their crops; (iv) males are 7.5 percentage points more likely to cultivate a rented field and 9.6 less likely to cultivate a field granted by local leaders; and (v) female-managed fields are closer to their home (on average, male fields are 1.9 kilometers away from their home, while female fields are only 0.8 kilometers away).

Regarding input use, female managers have lower access to agricultural tools, irrigation and agricultural use of livestock. Contrastingly, they use organic fertilizer more often. Information from Table 1 indicates that: (i) female managers live in households with less access to agricultural tools;[20] (ii) female managers have lower availability of oxen for agricultural purposes (on average, female managers manage 0.9 oxen per hectare, while male managers employ 1.3); (iii) fields managed by female managers have 1.1 percentage points lower access to irrigation, but overall access is low (only 2.8 percent of male managed fields have access); (iv) female managers are more likely to use organic fertilizer (35 percent of female managed fields report using organic fertilizer compared to 29 percent of male managed fields); and given their usual marital status, (v) female managers' labor comes to a lesser extent from male household labor which they substitute with a higher frequency of male exchange labor.

Finally, female managers inhabit smaller households with lower income and dependency ratios. [21] In this respect, Table 1 shows that: (i) female managers' value of household total weekly consumption and self-produced consumption is lower than males' (male managers' households value of total and self-produced consumption is 234 and 155 Birr per week,[22] respectively, while females' corresponding figures are 193 and 126 Birr per week); (ii) female managers live in households that are, on average, 1.7 members smaller than male; and (iii) male managers inhabit households with higher dependency ratios (male managers' households average 0.67 dependency ratio while female managers' households average 0.54) which might also be mainly explained by female managers' marital status.

Table 2 shows naïve estimates of gender productivity differences that result from adding fixed effects for crop products and different levels of geographical aggregation. Gender productivity differences resulting from these estimates range between 12.1 and 24.6 percent.[23] It is interesting to note that the proportion of explained variability (measured with the R-squared) dramatically

[19] Intercropping refers to planting more than one crop on a single field. The alternative to intercropping is having a pure-stand field.
[20] Measured with an "agricultural index" created using principal component analysis and dummies of holding of the following resources: (a) sickle, (b) axe, (c) pickaxe, (d) traditional plough, (e) modern plough, (f) water pump, and (g) agricultural livestock availability.
[21] The dependency ratio definition used throughout the paper is number of children below age 10 over number of individuals above age 10 in a household.
[22] The Birr to US Dollar inter-bank exchange rate as of March 2012 was 17.36 Birr per U.S. Dollar (consulted at www.nbe.gov.et)
[23] Table A.2 in the Appendix shows that these estimates are sensitive to outlier exclusion and not to selectivity that results from covariate availability.

increases between the region and *woreda* fixed effect estimates. Geographically, we do not find a statistically significant difference in productivity between male and female managers below the region fixed-effects level. With regional fixed effects, we observe an unconditional gender gap of 24.6 percent difference favoring male managers. For the more disaggregated geographical levels (*woreda*, *kebele* and EA), the difference declines to 12 percent and is not statistically significant at the traditional significance levels. Correlations between local fixed characteristics and some of the inputs might explain this change, but also it should be noted that standard errors are high. Thus, caution should be taken in the interpretation of the results.

Figure 1 shows a broader view of the gender differences by showing kernel density estimates of male and female managers' productivity. From the graph, it is possible to see that the male productivity distribution is shifted to the right with respect to the female's, and that the difference is particularly high at the middle of the distribution.

4 Empirical analysis based on decomposition methods

Decomposition methods have been widely used in the gender and union wage gap literature. Also, they have been employed to understand which factors explain changes in inequality and which explain growth (Fortin et al. 2010). This paper takes a decomposition method approach to determine to what extent differences in access to some productivity determinants translates into gender differences in agricultural productivity.

The main purpose of decomposition methods is to partition the overall difference of a given distribution statistic of interest between two groups:[24]

$$\Delta_O^{\nu} = \nu\left(F_{Y_B|D_B}\right) - \nu\left(F_{Y_A|D_A}\right) \quad (1)$$

where $\nu(\cdot)$ is a distributional statistic of interest (usually the mean) and $F_{Y_B|D_S}$ is the cumulative distribution of the potential outcome[25] Y_g for individuals of group s. In this paper, the mutually-exclusive groups are male and female managers. To be able to construct counterfactuals, usually wage structures are assumed, which use as inputs observed (X_i) and unobserved (ε_i) individual characteristics. This can be represented with a structural form equation:

$$Y_{gi} = m_g(X_i, \varepsilon_i) \quad (2)$$

By imposing the simple counterfactual treatment, overlapping support, and ignorability assumptions,[26] the overall difference (Δ_O^{ν}) in equation (1) can be split in two terms:

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[24] Fortin et al. (2010) proposed notation is followed, which favors comparability in the setup of the different decomposition methods.

[25] The two mutually-exclusive groups will be referred to as g = {A, B}. The potential outcome is defined in: $Y_i = Y_{gi}D_{gi}$, where Y_i is the observed outcome, Y_{gi} is the potential outcome, that is the outcome that individual *i* would receive if he belonged to group g, and D_{gi} is a dummy indicating individual *i*'s group membership (note that $D_{Ai} + D_{Bi} = 1$). The potential outcome framework is needed to establish the counterfactual distribution $F_{Y_A^C|D_B}$, that is, the cumulative distribution that would result if managers of group B received their potential outcomes Y_A. The counterfactual distribution of group A managers can be established in a similar fashion.

[26] The simple counterfactual treatment assumption assumes that the counterfactual outcome Y_{Ai} can be obtained for an individual of group B by using this individual's characteristics and the structural form equation of group A. The overlapping support assumption indicates

$$\Delta_O^{\nu} = \underbrace{\left(\nu\left(F_{Y_B|D_B}\right) - \nu\left(F_{Y_A^C|D_B}\right)\right)}_{\Delta_S^{\nu}} + \underbrace{\left(\nu\left(F_{Y_A^C|D_B}\right) - \nu\left(F_{Y_A|D_A}\right)\right)}_{\Delta_X^{\nu}} \quad (3)$$

where: (i) Δ_S^{ν} is called the "structural effect" (also called the unexplained effect), which represents differences in returns to observable and unobservable characteristics between the structural form equations $m_A(X_i, \varepsilon_i)$ and $m_B(X_i, \varepsilon_i)$; and (ii) Δ_X^{ν} is called the "composition effect", which reflects differences in the distribution of observable characteristics between both groups.[27]

4.1 Oaxaca-Blinder mean decomposition

The initial decomposition estimation presented here follows the procedure established by Oaxaca (1973) and Blinder (1973) that corresponds to estimating the mean (the average manager) in the framework established (Δ_O^{μ}) by adding the following assumptions:

a) *Additive linearity*. This implies that the structural form equation can be represented by a linear additively separable function of individuals' observed and unobserved characteristics:

$$Y_{gi} = m_g(X_i, \varepsilon_i) = X_i^{'}\beta_g + \upsilon_{ig} \qquad \text{for } g = \{A, B\} \text{ and } \upsilon_{ig} = \mathrm{h}_g(\varepsilon_i) \quad (4)$$

where X_i is a vector of characteristics considered for the analysis and β_g is a vector of coefficients that can be estimated using least squares of two separate regressions, one for each group.

b) *Zero conditional mean*. This indicates that:

$$E\left(\upsilon_{ig} \middle| X_i, D_{Bi}\right) = 0 \quad (5)$$

By applying these assumptions to our framework to estimate the mean difference we obtain:

$$\Delta_O^{\mu} = \left(\mu\left(F_{Y_B|D_B}\right) - \mu\left(F_{Y_A^C|D_B}\right)\right) + \left(\mu\left(F_{Y_A^C|D_B}\right) - \mu\left(F_{Y_A|D_A}\right)\right)$$

$$= \underbrace{E(X_i|D_{Bi})\,(\beta_B - \beta_A)}_{\Delta_S^{\mu}} + \underbrace{\left(E(X_i|D_{Bi}) - E(X_i|D_{Ai})\right)\beta_A}_{\Delta_X^{\mu}} \quad (6)$$

The specification that will be used to derive the first set of results of the paper follows Cain (1986) and Fortin (2008) to generate an alternative measure for the structural effect by adding and

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that no single value of observables or unobservables can be used to identify membership of a group. The ignorability assumption implies that, conditional on the observable characteristics (X), the unobservable characteristics (ε) have the same conditional distribution among both groups. See Fortin et al. (2010) for further details of the assumptions.

[27] Note that the ignorability assumption rules out a third term of the decomposition $\Delta_{\varepsilon}^{\nu}$, that corresponds to differences in unobservable characteristics between both groups.

subtracting $E(X_i|D_{Bi})\,\beta^*$ and $E(X_i|D_{Ai})\,\beta^*$, where β^* results from a pooled sample least square estimation that adds as a covariate D_{Bi}:

$$\Delta_O^{\mu} = \underbrace{E(X_i|D_{Bi})\,(\beta_B - \beta^*) + E(X_i|D_{Ai})\,(\beta^* - \beta_A)}_{\Delta_S^{\mu}} + \underbrace{\big(E(X_i|D_{Bi}) - E(X_i|D_{Ai})\big)\beta^*}_{\Delta_X^{\mu}} \qquad (7)$$

In this case, the structure effect (Δ_S^{μ}) is divided in two terms: (i) male structural advantage $E(X_i|D_{Bi})\,(\beta_B - \beta^*)$, and (ii) female structural disadvantage $E(X_i|D_{Ai})\,(\beta^* - \beta_A)$.

Given the additive linearity assumption, a detailed decomposition can be estimated and it will satisfy the path independence property.[28] The detailed decomposition will estimate the contribution of each covariate (elements of Table 3) to the structure and composition effects. This will yield very valuable information from a policy perspective since it will be possible to show which elements are more relevant in explaining any gender gap that may exist for the average manager.

4.2 Heterogeneous productivity differences along the distribution

While the OB method provides the analysis for the average manager, the analysis is extended by employing recentered influence functions regressions (hereon RIF regressions) proposed by Firpo et al. (2009). This method allows the gender productivity differences to be estimated for distributional statistics $\nu(\cdot)$ other than the mean. This procedure additionally allows performing detailed decompositions for any distributional statistic. This could be important from a policy perspective if the relative importance of each factor of production to the gender gap differs along the agricultural productivity distribution.

In the case of quantiles, the RIF regression is defined as:[29]

$$RIF(Y_i, Q_\tau) = Q_\tau + \frac{\tau - 1\{Y_i \le Q_\tau\}}{\mathrm{f}_y(Q_\tau)} = c_{1,\tau}1\{Y_i > Q_\tau\} + c_{2,\tau} \qquad (8)$$

where $c_{1,\tau} = 1/\mathrm{f}_y(Q_\tau)$ and $c_{2,\tau} = Q_\tau - c_{1,\tau}(1-\tau)$ are constant terms for a given Q_τ. Hence, estimating an RIF regression is similar in spirit as estimating a probit, logit or linear probability model.

A property of RIF regressions that makes them ideal for decomposition methods is that $\big(RIF(Y_i, Q_\tau)\big) = Q_\tau$. Therefore, by estimating the RIF-regression with a linear probability model,[30] we can employ RIF-regressions in our framework:

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[28] A decomposition procedure is path independent if the order in which the different covariates are computed, does not affect the results of the decomposition.

[29] The general definition of a RIF regression is: $RIF(y, \nu) = \nu(F_Y) + IF(y, \nu)$

[30] This means estimating $E\big(RIF_g(Y_i, Q_\tau)|X_i, D_g\big) = X_i'\gamma_{\tau,g} + \varepsilon_i$ using only observations from group g. This is just a linear probability model, where the dependent variable is calculated using (8). In this case, $\mathrm{f}_y(Q_\tau)$ is estimated using a non-parametric kernel density estimation. Similarly, as in the Oaxaca-Blinder decomposition, a pooled sample can also be used. We will denote the corresponding estimate of that regression as γ_τ^*.

$$\Delta_O^{\tau} = \left(\tau\left(F_{Y_B|D_B}\right) - \tau\left(F_{Y_A^C|D_B}\right)\right) + \left(\tau\left(F_{Y_A^C|D_B}\right) - \tau\left(F_{Y_A|D_A}\right)\right)$$

$$= \underbrace{E(X_i|D_{Bi})\left(\gamma_{\tau,B} - \gamma_{\tau}^*\right) + E(X_i|D_{Ai})\left(\gamma_{\tau}^* - \gamma_{\tau,A}\right)}_{\Delta_S^{\tau}} + \underbrace{\left(E(X_i|D_{Bi}) - E(X_i|D_{Ai})\right)\gamma_{\tau}^*}_{\Delta_X^{\tau}} \qquad (9)$$

where Δ_X^{τ} is the composition effect for the τ quantile, and Δ_S^{τ} is the structure effect for the τ quantile, which similarly as in the Oaxaca-Blinder decomposition is divided into male structural advantage and female structural disadvantage.

Additive linearity is kept in the RIF regression framework, therefore detailed decompositions can be computed. This methodology is used to derive the second set of results presented in the paper.

4.3 Main specification

As detailed in section 3, it is assumed that agricultural productivity is a function of the characteristics of the manager, labor and non-labor inputs, and land characteristics. The coefficient of the gender indicator will generally be interpreted as the gap in productivity between male and female managers. The theoretical approach is yield-based, thus the regression analysis includes inputs per unit of land. Manager, land and household characteristics are included in the analysis. The possible endogeneity problem in the specification is recognized. Still, the objective of the paper is not to infer causality, but rather to identify to what extent the set of observed characteristics explain the overall gender differences in productivity and thus inform policy by identifying possible areas of intervention that could address the gap. Bias in the estimates might arise if the ignorability assumption is not valid. To test for this, a group of robustness checks will be estimated, but still bias arising from unobservables is likely.

Table 3 shows the main set of covariates added to the naïve regression (without fixed effects). After adding several of the covariates considered in Table 1, the productivity difference decreases to 13.4 percent (conditional gender gap) and is not statistically significant. The empirical analysis presented here will decompose the unconditional gap of 23.4 percent found in Table 1 into the portion due to the endowment effect and that due to the structural effect by employing decomposition methods.

5 Results

5.1 Preliminary analysis

Table 3 shows the results from least square estimates for the pooled sample and by gender. As described in the methodology, these estimations are one of the main components in the Oaxaca-Blinder decomposition. The evidence presented in the table suggests that the logarithm of total area administered and number of fields managed have an overall negative effect toward production, while number of crops has a positive influence concentrated on female managers. Being in possession of rented parcels has a positive effect on productivity. The use of chemical fertilizer, pesticides, herbicides, and fungicides has a positive effect on productivity and the effect is more pronounced for female managers. Labor input has a positive (not statistically significant) effect for

all kinds of labor employed (household, hired, and exchange), except for household's children labor which has a negative (and statistically significant) impact for male managers and a positive effect for female managers. Only male managers obtain positive and statistically significant returns from their time spent in agricultural labor. With respect to human capital, only female managers denote a positive and statistically significant effect from years of schooling. The dependency ratio has a negative effect towards production, while household size has a positive impact, and both effects are more pronounced for male managers. Finally, farther distances to the closest market are negatively related to productivity.

5.2 Oaxaca decomposition

As described in section 4.1, the Oaxaca-Blinder decomposition will distinguish what proportion of the baseline gender productivity difference can be attributed to: (i) differences in average characteristics of productivity generating factors (composition effect), as shown in Table 1; and (ii) gender differences in their returns (structure effect), as shown in Table 3.

5.2.1 Aggregate decomposition

The aggregate decomposition results show that of the 23.4 percent gender productivity gap, 43.2 percent is explained by the composition effect and the remaining 56.8 percent results from the female structural disadvantage. Therefore, 13.4 percentage points remain unexplained.

5.2.2 Detailed decomposition

Land size, proportion of parcels rented, household size, dependency ratio, household wealth estimate (value of consumption), and manager's hours destined to agricultural activities are the largest contributors towards explaining the endowment effect. Panel C of Table 4 shows the results from the detailed decomposition for all the covariates included in the analysis.[31]

Given the additive linearity property, it is possible to determine the contribution of each component towards the endowment, structure, and overall effects. The ratio of the different components with respect to the endowment effect (and the overall gender gap in parentheses) describe the importance of each term:[32] (i) land size (logarithm of hectares managed) makes up 0.94 times the total endowment effect in absolute value (and 0.41 of the overall gender gap); (ii) proportion of parcels rented explains 0.47 (0.20); (iii) manager's agricultural non-labor input use[33] accounts for 0.15 (0.06); (iv) manager's time use in agriculture contributes with 0.31 (0.13), while household's input labor adds 0.32 (0.14), hired labor less than 0.01 and exchange labor 0.18 in favor of female managers; (v) access to extension and credit services barely explains a non-significant 0.06 (0.02); and finally, (vi) household size and dependency ratio represent 0.54 (0.23) and 0.18 (0.08), respectively.

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[31] As noted in section 4, this result is closely related to the mean comparison previously described and illustrated in Table 1.

[32] The reported proportions are obtained after dividing the composition effect by 0.101 for the proportion of the endowment effect and by 0.234 for the proportion of the overall gender difference. Nonetheless, it must be noted that the additive linearity also means that positive and negative estimates might cancel among each other, therefore the calculated proportions should be interpreted as a ratio rather than a proportion of the effects.

[33] This includes: oxen per hectare, irrigation, pesticide, fungicide, herbicide, improved seed, and fertilizer use.

With respect to the structure effect, since coefficients cannot be interpreted causally, it is not possible to trace back the source of gender differences in this case. Still, the detailed decomposition gives us valuable information since it identifies the factors to which the productivity generating function is more sensitive. As explained in section 4, the structure effect reflects differences in the returns to observable and unobservable characteristics between the female and male structural form equations. Therefore, differences in changes of the productivity generating function as a result of marginal changes to the covariates will be captured here.

The main factors that explain structural differences include years of schooling, access to extension services, number of crops produced, use of non-labor inputs (mainly fertilizers), and land characteristics (mainly distance to household). The components related to female structural disadvantages include:[34] (i) access to extension services, (ii) manager's hours per week for agricultural activities, (iii) land size, (iv) number of fields managed by the manager, (v) land certification, (vi) fields' distance to the household, (vii) fertilizer access, and (viii) oxen availability (per hectare). Covariates related to male structural advantage are:[35] (i) access to extension services, (ii) land certification, (iii) fertilizer access, and (iv) oxen availability (per hectare). Also, the following variables can be related to female structural advantages or male structural disadvantages:[36] (i) years of schooling, (ii) number of crops produced (measure of diversification), (iii) irrigation access, (iv) organic fertilizer availability, (v) pesticide, herbicide, or fungicide use, (vi) chemical fertilizer employed (per hectare), and (vii) household child labor use. Most of these female advantages (or male disadvantages) could be explained by decreasing returns to inputs and lower quantities provided for female managers. This would be interesting to analyze in a within-household Pareto-efficiency framework as in Udry (1996) and Akresh (2005), nonetheless, data limitations from the ERSS survey prevent this.

5.3 Female subgroups

Traditional gender roles generally link females to "home economics" production which involves activities like horticultural production and raising poultry (World Bank and IFPRI 2010). Extension services targeted to females are even designed ad-hoc according to their common roles in production. This implies that when comparing female to male managers it is relevant to distinguish between different roles that female managers might be representing within the household. In particular, female managers embody very different levels of responsibility as spouses or household heads. Typical gender studies only compare male to female household-headed units (World Bank 2011). Since the ERSS survey specifically asks for the manager at the plot level, the data set allows analyzing productivity differences for different female subgroups.

Table 5 shows the decomposition results by distinguishing between married and not-married female managers (columns 1 and 3). Furthermore, the not-married group is subdivided in single, divorced and widowed females (columns 2 and 4). As evidenced in the results, not-married female managers are 30.2 percent less productive than male managers. Most of this difference results from the structural effect since the difference after controlling for covariates is only reduced to 23.9 percent. Contrastingly, married female managers are non-significantly less productive than male managers (3.9 percent) and after controlling for covariates, the difference favors female managers by 15.8 percent (not statistically significant also). Columns 2 and 4 show that single and widowed females

[34] This includes the positive and significant coefficients of Table 4, panel C, column 3.
[35] This includes the positive and significant coefficients of Table 4, panel C, column 2.
[36] This includes the negative and significant coefficients of Table 4, panel C, columns 2 and 3.

are in the greatest disadvantage, but the composition effect is greater for single and divorced females, which might be partly explained by the disadvantaged position that they hold in society (Fafchamps and Quisumbing 2001).

5.4 Distributional results – RIF regressions

This section presents the results from applying the RIF-regression estimation and then performing the Oaxaca-Blinder decomposition. As described in section 4.2, this procedure allows identifying the endowment, structural and overall effects along the productivity's distribution.

5.4.1 Aggregate decomposition

Table 6 results from estimating equation (9) and decomposing the overall difference at different quantiles in the endowment and structural effects. Table 6 and Figure 2 show that the gender productivity differentials peak in the middle of the productivity distribution. The largest overall gender differences are observed for the 30th, 50th and 60th percentiles (25.4, 25.5 and 25.4 percent, respectively), while the lowest (and not statistically significant) differences are observed at the bottom of the distribution (11.8 and 16 percent for the 10th and 20th percentile, respectively). It is worth noting that, not only is the gender gap smaller and not statistically significant for the 10th and 20th percentile, but also the endowment effect explains most of the gender gap at the level. The results for the bottom percentiles even suggest that if females had equal access to resources, the gender gap would diminish. This finding could be important from a policy perspective as it shows that at lower levels of productivity, male and female managers observe similar returns to factors of production and the gender gap is mostly due to lower access to resources for women. Thus, providing women in the lower quintiles with more access to resources could go a long way towards reducing the gap at that level. Differences in the returns (structural effect) have big impact at the middle of the productivity distribution and explain the trend of the productivity differentials at these levels.

5.4.2 Detailed decomposition

Table A.3 provides the detailed decomposition for the 10th, 50th, and 90th percentile of the productivity. These estimations result from using the RIF-regression procedure detailed in equation (9), where the coefficients correspond to those obtained through linear probability models estimations. In these estimations (not shown), the dependent variable is the recentered influence function at different quantiles and the covariates are the same set of controls used in the Oaxaca-Blinder portion.

As described above, the 10th percentile has an atypical level of inequality that results mainly from an abnormally high endowment level and an uncharacteristic female structural advantage. The higher endowment effect in this percentile is mainly driven by higher differences in the proportion of rented fields, household size and number of crops produced. Throughout the rest of the productivity distribution, the endowment effect reaches its highest differences between the 50th and 70th percentile. The main drivers of these levels are: managers' time spent in agricultural activities, household wealth differences and rental land occupation.

The structural effect peaks at the middle of the distribution (between the 30th and 80th percentile), exactly where the productivity gap reaches its highest levels. The detailed decomposition has the added value of providing the contribution of each covariate along the productivity distribution. Findings from this analysis are: (i) decreasing structural female disadvantage arising from age (proxy for experience of the manager) that turns into structural advantage at the right tail of the distribution; (ii) female structural disadvantage from access to extension programs and land tenancy certificate holding mainly at low percentiles; (iii) female structural disadvantage from land size and number of fields managed primarily at the middle of the distribution; (iv) decreasing female structural advantage from number of crops planted; (v) decreasing female structural disadvantage from oxen accessibility; and (vi) female structural advantage of organic and chemical fertilizer, as well as herbicide, pesticide and fungicide use, concentrated in low levels of the distribution.

5.5 Regional analysis

As described in section 3, the data set is representative for the four largest regions: Amhara, Tigray, Oromiya and SNNP. Table 7 displays the results for each of these regions. Columns 1 and 3 compare females in each region with respect to the average male; columns 2 and 4 show intra-regional comparisons. Columns 1 and 2 display overall differences, while columns 3 and 4 exhibit the structural component (i.e. the gender differences after controlling for the baseline covariates).

As evidenced from Table 8, female managers at SNNP are at the greatest disadvantage, being 61.4 percent less productive than the average male. In contrast, female managers at Tigray are 33.1 percent more productive than the average male. These differences are reduced to a 5.2 percent disadvantage and 5.1 percent advantage, respectively, after removing the endowment effect. However, these differences reflect both gender and cross-regional disparities. The within region analysis shows that the regions with greater female disadvantage are Amhara and SNNP, where female managers are 40.1 and 28.3 percent less productive than males in the same region. After controlling for the baseline covariates, differences in SNNP disappear (becoming 1.2 percent and not statistically significant), while disparities at Amhara remain significant. Differences in the other regions (Tigray and Oromiya) are not statistically significant.

5.6 Fallow fields likelihood

So far, the evidence presented assumes positive production in the productivity measure. An additional difference in productivity might arise from differences in the proportion of agricultural fields in which the manager could not or decided not to produce. As an extension to the analysis presented, estimates of fallow field likelihood are added. Columns 1 and 2 in Table 8 use manager as the unit of observation and proportion of fallow field managed (out of total number of fields) as dependent variable. Columns 3 and 4 use field as unit of observation and a dummy indicating if the field was left fallow as dependent variable. A subset of the covariates used in the main specification is included as controls in columns 2 and 4. Hence, to be consistent with the previous decomposition analysis, the table shows the overall gender difference in the likelihood of managing fallow fields and the difference that remains after controlling for a group of covariates.

Overall, female-managed fields are 0.6 and 0.9 percentage points more likely to be fallow (using column 1 and 3 results), just the second estimate being significant at the 10% level. After controlling for manager, plot, land and household characteristics, the value remains mostly

unchanged. In these specifications, female managed fields are 0.7 and 1.1 percentage points more likely to be fallow, with the second estimate being significant at the 5% level. Covariates that significantly explain a field being fallow include total fields sized, number of fields managed, number of crops produced, manager's proportion of plots rented, distance to the closest market and soil nutrient constraint.

6 Robustness checks

As described in section 4, the decomposition methods assume simple counterfactual treatment, overlapping support and ignorability. Tests to these assumptions are presented or proposed in this section. To the extent possible, alternative specifications that relax some of the assumptions are employed to determine the sensitivity of the results.

6.1 Testing ignorability

Ignorability is a weaker assumption than the traditional OLS mean independence assumption. Ignorability implies that the distribution of unobservables, conditional on X, is the same in both groups $g=\{A,B\}$. By imposing ignorability, it is established that changes in the distribution of observables (X) will not be reflecting changes in the distribution of unobservables. This is key in the decomposition specifications.

Following Altonji et al. (2005), different specifications are employed to assess the possibility of selection on unobservables in the baseline specification. To perform this test, a set of additional controls grouped by topic are subsequently added to the baseline specification. The purpose of the exercise is to test if the coefficients of the baseline least square estimates (Table 3) that are employed in the OB decompositions are sensitive to these alternative specifications. Five alternative specifications are considered, where the following controls were added to the baseline specification: (i) additional manager characteristics, which include age squared, a dummy variable for illiteracy, dummy for receiving advisory services, and a self-reported health variable; (ii) additional land features, that include dummy for crop rotation, average field elevation and wetness, dummies for other basis of land occupation (e.g. invasion, granted by local leaders), and number of fruit bearing trees in the manager's land; (iii) additional household variables, such as reception of government assistance, dummy for previous formal credit reception, distances to closest road and population center, average meals per day consumed by adults, and proportion of production that is self-consumed; (iv) crop product fixed effects; and (v) geographical fixed effects at the *woreda* level.

Tables A.4, A.5, and A.6 report the results for the pooled, male, and female samples.[37] These tables correspond to sensitivity analysis of columns 2, 3, and 4 of Table 3, respectively. As can be seen from the tables, the results are robust to the first three specifications and are sensitive towards the product fixed effect and geographical fixed effects. The product fixed effect result might be a consequence that farmers self-select into certain crop production based on given managers' characteristics. As for the *woreda* fixed effect results, changes in the coefficients might absorb ethnic differences that arise at a local level, as well as geographical, climate, and political characteristics.

[37] The coefficients for the added covariates are not reported. However they can be made available upon request.

6.2 Relaxing the overlapping support

Ñopo (2008) suggested a methodology to relax the overlapping support assumption. The motivation for his work was the existing segregation into specific industries and occupations based on gender and workers' characteristics. In the context of agricultural productivity, the methodology can be applied given that female managers tend to be segregated to produce specific crops in the vicinity of their homes. Meanwhile, as described in section 2, cultural norms might restrict roles played by each gender. For instance, better market accessibility for males might explain higher participation in cash and export crops. A suggested extension to the present work consists of applying Ñopo's (2008) methodology. This should increase the proportion of the productivity gap explained.

7 Conclusions

This study benefits from recent data collection efforts that are part of the Living Standards Measurement Study (LSMS) - Integrated Surveys on Agriculture Project. Improvements in data quality in this less developed context are important tools to advance in the understanding of development-relevant questions such as the gender differences in agricultural productivity.

Evidence presented in this paper confirms the existence of gender differences in productivity that has been documented in the literature. Estimates of a statistically significant gap of 23.4 percent between male and female managers are reduced to 13.4 percent (statistically insignificant) after accounting for differences in managers' characteristics, land attributes, and access to productive resources. The unexplained portion of the gap is large with respect to previous studies in the Sub-Saharan context. A reduction of the gender gap is found after analyzing the difference along the distribution of productivity, showing higher inequality in the middle of the productivity distribution. Furthermore, it is in the left-tail of the productivity distribution where endowment differentials explain the largest share of the overall gender differences. This indicates that at lower levels of productivity, returns to factors of production are similar for men and women and the gender gap is largely due to lower access to resources for women.

The detailed decomposition is a powerful tool from a policy perspective since it allows identifying the sources that generate higher portions of the endowment and structure components of the decomposition. The analysis suggests that differences in land size, household’s wealth level, household size, dependency ratio, production in rented fields, and manager's involvement through time use in agriculture are the most relevant components of the endowment differences. With respect to the structure effect, years of schooling, access to extension services, product diversification, use of non-labor inputs (mainly fertilizers), and land characteristics (mainly distance to household) are some of the components that display unequal returns between both groups.

Solving gender inequality is a challenging problem on several grounds. In the agricultural context, it is of great importance in countries with low levels of development where poor households heavily rely on agriculture for their livelihood. Improving gender equality could boost agricultural growth and greatly contribute to the reduction of poverty and advance towards food security. As a result, research that improves information about sources of inequality is crucial in this task.

References

Akresh, R. (2005). “Understanding pareto inefficient intrahousehold allocations.” Discussion Paper No. 1858, IZA.

Alene, A. D., Manyong, V. M., Omanya, G. O., Mignouna, H. D., Bokanga, M., & Odhiambo, G. D. (2008). “Economic efficiency and supply response of women as farm managers: Comparative evidence from Western Kenya.” *World Development* 36 (7), 1247–1260.

Bezabih, M., & Holden, S. (2010). “The Role of Land Certification in Reducing Gender Gaps in Productivity in Rural Ethiopia.” Discussion Paper No. 10-23, Environment for Development (EfD).

Blinder, A. (1973). “Wage discrimination: reduced form and structural estimates.” *Journal of Human Resources*, 8, 436–455.

Cain, G. (1986). “The Economic Analysis of Labor Market Discrimination: a Survey.” In Ashenfelter, O.C. & R. Layard, (Eds.), *Handbook of Labor Economics*, North-Holland, Vol. 1, 709–730.

Dammert, A.C., Ural Marchand, B., Wan, C. (2013). “Gender Wage-Productivity Differentials and Global Integration in China” Discussion Paper No. 7159, IZA.

Deininger, K., Ayalew, D., Holden, S., & Zevenbergen J. (2007). “Rural land certification in Ethiopia: Process, Initial Impact, and Implications for Other African Countries.” World Bank, Washington, DC: World Bank Policy Research Working Paper No. 4218.

Dickerson, A., McIntosh S., & Valente C. (2013). “Do the Maths: An Analysis of the Gender Gap in Mathematics in Africa.” Discussion Paper No. 7174, IZA.

Dorosh, P. & Radish, S. (2012). Introduction, *Food and Agriculture in Ethiopia, Progress and Policy Changes*, Dorosh, P. & Radish, S. (Eds.), (1-17). Philadelphia, Pennsylvania: IFPRI, published by University of Pennsylvania Press.

Fafchamps, M., & Quisumbing, A.R. (2001). “Control and Ownership of Assets Within Rural Ethiopian Households.” Discussion Paper No. 120, IFPRI, FCND.

Fafchamps, M., & Quisumbing, A.R. (2002). “Marriage and Assortative Matching in Rural Ethiopia.” Working Paper No. 2002-21, CSAE.

Fortin, N. (2008). “The Gender Wage Gap among Young Adults in the United States: The Importance of Money vs. People.” *Journal of Human Resources*, 43: 886-920.

Fortin, N., Lemieux, T., Firpo, S. (2010). “Decomposition Methods in Economics” Working Paper 16045, NBER.

Fortson, K., Rangarajan, A., Blair, R., Lee, J., & Gilbert V. (2012). “Investing in Agricultural Training: Evaluation of the Water-to-Market Farmer Training in Armenia.” Mathematica Policy Research. APPAM Conference.

Gilbert, R. A., Sakala, W. D., & Benson, T. D. (2002). “Gender analysis of a nationwide cropping system trial survey in Malawi.” *African Studies Quarterly*, 6 (1).

Goldstein, M., & Udry, C. (2008). “The profits of power: Land rights and agricultural investment in Ghana.” *Journal of Political Economy* 116 (6), 981–1022.

Jann, B. (2008). “The Blinder-Oaxaca decomposition for linear regression models.” *The Stata Journal*¸ 8 (4), 453-479.

Kilic, T., Palacios-Lopez, A., & Goldstein, M. (2013). "Caught in a Productivity Trap: A Distributional Perspective on Gender Differences in Malawian Agriculture." Policy Research Paper No. 6381, The World Bank.

Kinkingninhoun-Medagbe, F., Diagne, A., Simtowe, F., Abgoh-Noameshie, A., & Adegbola, P. (2010). "Gender Discrimination and Its Impact on Income, Productivity, and Technical Efficiency: Evidence from Benin", *Agricultural and Human Values*, 27 (1): 57-69.

Kumar, N., Quisumbing, A.R. (2012). " Policy Reform toward Gender Equality in Ethiopia: Little by Little the Egg Begins to Walk." Discussion Paper 01226, IFPRI.

Moock, P. R. (1976). "The efficiency of women as farm managers: Kenya." *American Journal of Agricultural Economics*, 58 (5), 831–835.

Ñopo, H. (2008). "Matching as a Tool to Decompose Wage Gaps", *The Review of Economics and Statistics*, 90 (2): 290–299

Oaxaca, R. (1973). "Male-female wage differentials in urban labor markets", *International Economic Review*, 14, 693–709.

Oladeebo, J. O., & Fajuyigbe, A. A. (2007). "Technical efficiency of men and women upland rice farmers in Osun State, Nigeria." *Journal of Human Ecology*, 22 (2), 93-100.

Pender, J., & Fafchamps, M. (2000). "Land Lease Markets and Agricultural Efficiency: Theory and Evidence from Ethiopia." Working Paper No. 2002-19, CSAE.

Peterman, A., Quisumbing, A., Behrman, J., & Nkonya, E. (2011). "Understanding the complexities surrounding gender differences in agricultural productivity in Nigeria and Uganda." *Journal of Development Studies*, 47 (10), 1482-1509.

Quisumbing, A., Payongayong, E., Aidoo, J. B., & Otsuka, K. (2001). "Women's land rights in the transition to individualized ownership: Implications for the management of tree resources in western Ghana." *Economic Development and Cultural Change*, 50 (1), 157-182.

Rijkers, B., & Costa, R. (2012). "Gender and Rural Non-Farm Entrepreneurship" Washington, DC: The World Bank.

Saito, K. A., Mekonnen, H., & Spurling, D. (1994). "Raising the productivity of women farmers in Sub-Saharan Africa." Discussion Paper Series 230, Africa Technical Department, The World Bank.

Tadesse, G. "Parcel Identification System of CSA, Land Area Measurement and Problems Attached: *CSA's Experience*." Retrieved from http://www.oicrf.org/document.asp?ID=10087

Taffesse, A.S., Dorosh, P., & Gemessa, S.A. (2012) "Crop Production in Ethiopia: Regional Patterns and Trends." In Dorosh, P. & Radish, S. (Eds.), *Food and Agriculture in Ethiopia, Progress and Policy Changes* (53-83). Philadelphia, Pennsylvania: IFPRI, published by University of Pennsylvania Press.

Tiruneh, A., Tesfaye, T., Mwangi, W., & Verkuijl H. (2001). "Gender Differentials in Agricultural Production and Decision-Making Among Smallholders in Ada, Lume, and Gimbichu Woredas of the Central Highlands of Ethiopia." EARO, CIMMYT, funded by the European Union.

Tronvoll, K., & Hagmann, T. (2012). "Traditional Authorities and Multi-Party Elections in Ethiopia." In *Contested Power in Ethiopia, Traditional Authorities and Multi-Party Elections.* Tronvoll, K., & Hagmann, T. (Editors). Boston, BRILL.

Udry, C. (1996). "Gender, agricultural production, and the theory of the household." *Journal of Political Economy*, 104 (5), 1010–1046.

Vargas Hill, R., & Vigneri, M. (2011). “Mainstreaming gender sensitivity in cash crop markets supply chains.” Working Paper No. 11-08, ESA, FAO.

Vaughan, S. & Tronvoll, K. (2003). “The Culture of Power in Contemporary Ethiopian Political Life.” Sida Studies No. 10.

World Bank (WB) (2006). *World Data on Education: Ethiopia*. Washington, DC: The World Bank.

World Bank (WB) (2007). W*orld development report 2008: Agriculture for Development.* Washington, DC: The World Bank.

World Bank (WB) & International Food Policy Research Institute (IFPRI) (2010). *Gender and governance in rural services: insights from India, Ghana, and Ethiopia*. Washington, DC: The World Bank.

World Bank (WB) (2011). W*orld development report 2012: Gender Equality and Development.* Washington, DC: The World Bank.

Table 1: Descriptive Statistics & Results from Tests & Mean Differences by Gender of Manager

	Pooled Sample	*Male Manager*	*Female Manager*	*Difference*
Outcome Variable				
Self-Reported Productivity (Birr/HA)	7509.0	7756.3	6133.0	-1623.3***
Log (Self-Reported Productivity)	8.467	8.502	8.268	-0.234***
Manager Characteristics				
Age (years)	45.24	44.68	48.37	3.696***
Relationship to Household Head				
Head †	0.987	0.993	0.950	-0.0435**
Spouse †	0.00513	0.00170	0.0242	0.0225**
Son/Daughter †	0.00555	0.00488	0.00928	0.00439
Other Relative †	0.00253	-3.47e-18	0.0166	0.0166
Religion				
Orthodox †	0.512	0.505	0.553	0.0479
Protestant †	0.223	0.228	0.193	-0.0346
Muslim †	0.246	0.245	0.251	0.00591
Other †	0.0191	0.0220	0.00278	-0.0192***
Marital Status				
Single †	0.0211	0.0219	0.0165	-0.00538
Married †	0.844	0.950	0.253	-0.697***
Divorced †	0.0309	0.0142	0.124	0.110***
Widowed †	0.104	0.0138	0.607	0.593***
Illiteracy †	0.588	0.533	0.896	0.363***
Years of Schooling	1.579	1.772	0.506	-1.266***
Days Self-Reported Sick within Last Month	3.857	3.537	5.638	2.101*
Manager Disability †	0.0528	0.0419	0.113	0.0714***
Hours per Week for Agriculture Activities	21.69	22.99	14.44	-8.546***
Access to Extension Program †	0.357	0.363	0.321	-0.0416
Access to Credit Services †	0.261	0.271	0.204	-0.0673**
Access to Advisory Services †	0.704	0.704	0.707	0.00287
Manager Land Tenancy				
Total Land Managed (Hectares)	1.389	1.437	1.121	-0.316***
Number of Fields Managed	13.02	13.22	11.90	-1.316*
Total Number of Tree Bearing Fruit	176.2	189.5	102.4	-87.08**
Total Number of Crops Produced	7.378	7.486	6.776	-0.711**
Manager's Plot Certification (% of Total Fields)				
Fields for which HH has a Certificate	0.535	0.528	0.579	0.0515
Fields for which Manager Owns the Certificate	0.509	0.502	0.546	0.0439
Manager's Plot Occupation (% of parcels)				
Granted by Local Leaders	0.449	0.435	0.530	0.0958**
Inherited	0.416	0.417	0.412	-0.00498
Rented	0.0935	0.105	0.0298	-0.0752***
Invasion Without Permission	0.00504	0.00544	0.00284	-0.00259
Other	0.0364	0.0384	0.0254	-0.0130
Manager's Plot Characteristics				
Intercropping (% of fields)	0.244	0.250	0.209	-0.0405
Crop Rotation †	0.829	0.829	0.829	-0.000180
Elevation (m)	2003.1	1987.8	2088.0	100.2***
Wetness Index	12.62	12.61	12.65	0.0428
Slope	13.06	13.24	12.06	-1.188
Distance to Household	1.715	1.883	0.781	-1.102*
Manager's Agricultural Non-Labor Input Use (for Season)				
Fields that Use (% of Total)				
Irrigation	0.0271	0.0288	0.0178	-0.0110*
Fertilizer	0.478	0.471	0.514	0.0430
Organic Fertilizer	0.298	0.288	0.350	0.0619**
Crops that Use (% of Total)				
Pesticide	0.0202	0.0197	0.0232	0.00353
Herbicide	0.0820	0.0818	0.0829	0.00109
Fungicide	0.00587	0.00517	0.00973	0.00456
Pesticide, Herbicide or Fungicide	0.0980	0.0980	0.0978	-0.000178
Improved Seeds	0.0487	0.0483	0.0510	0.00272
Chemical Fertilizer Used per Hectare (KG/HA)	45.31	45.99	41.51	-4.485
Oxen per Hectare	1.229	1.282	0.934	-0.348**
Agricultural Implement Access Index	0.276	0.336	-0.0599	-0.396***

Table 1 (Continued)

	Pooled Sample	*Male Manager*	*Female Manager*	*Difference*
Manager's Agricultural Labor Input Use (for Season)				
Manager Labor (Hours/HA)	990.2	1019.3	828.0	-191.3
Household Male Labor Use (Hours/HA)	1164.9	1243.0	730.1	-512.9***
Household Female Labor Use (Hours/HA)	495.6	401.4	1019.5	618.1***
Household Child Labor Use (Hours/HA)	15.30	12.99	28.19	15.20
Hired Male Labor Use (Days/HA)	14.87	14.63	16.20	1.577
Hired Female Labor Use (Days/HA)	3.757	3.852	3.232	-0.619
Hired Child Labor Use (Days/HA)	0.621	0.519	1.190	0.671
Exchange Male Labor Use (Days/HA)	23.70	21.65	35.14	13.49**
Exchange Female Labor Use (Days/HA)	4.483	4.455	4.641	0.186
Exchange Child Labor Use (Days/HA)	0.543	0.514	0.701	0.187
Household Characteristics				
Weekly Vale of Household (Birr)				
Food Consumption	227.5	233.8	192.5	-41.28***
Food Self-Produced Consumption	150.5	155.0	125.6	-29.39***
Consumption Self-Produced (% of Total)	0.647	0.649	0.634	-0.0151
Average Adult's Meals per Day	2.807	2.803	2.830	0.0266
Wealth Index	-0.103	-0.101	-0.116	-0.0147
Assistance: PSNP †	0.0299	0.0195	0.0878	0.0684***
Assistance: Other †	0.106	0.105	0.113	0.00779
HH ever received formal creditd †	0.112	0.116	0.0855	-0.0309
Distance to (KM)				
Closest Road	15.19	15.00	16.26	1.257
Closest Populated Center	34.24	34.51	32.76	-1.746
Closest Market	59.30	60.06	55.05	-5.006
Household Size	5.328	5.594	3.851	-1.743***
Dependency Ratio	0.654	0.674	0.542	-0.131**
More than Half of the Household Production Sold †	0.0287	0.0246	0.0515	0.0269
Non-agricultural Labor Income †	0.170	0.162	0.213	0.0504
Household Agro-Ecological Zone Classification				
Tropic-Warm/Arid †	0.000128	0.000151	6.78e-19	-0.000151
Tropic-Warm/Semiarid †	0.0134	0.0141	0.00946	-0.00464
Tropic-Warm/Subhumid †	0.0118	0.0127	0.00668	-0.00603
Tropic-Cool/Semiarid †	0.271	0.275	0.253	-0.0221
Tropic-Cool/Subhumid †	0.495	0.502	0.451	-0.0519
Tropic-Cool/Humid †	0.209	0.196	0.281	0.0848**
Shocks				
Crop Damage †	0.428	0.435	0.392	-0.0426
Observations	1,518	1,277	241	
		(84.1%)	(15.9%)	

*** p<0.01, ** p<0.05, * p<0.1

† Denotes a Dummy Variable

Table 2: Naïve Regression Results on Gender Differences in Agricultural Productivity

	Dependent Variable: Log [Self-Reported Productivity (Birr/HA)]				
	(1)	(2)	(3)	(4)	(5)
Female †	-0.2461***	-0.1210	-0.1265	-0.1265	-0.1891**
	(0.0922)	(0.0852)	(0.0864)	(0.0864)	(0.0879)
Fixed Effects	Region	Woreda	Kebele	EA	Product Dummies
Observations	1,518	1,518	1,518	1,518	1,518
R-Squared	0.071	0.554	0.561	0.561	0.185

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable

Table 3: Base OLS Regression Results Underlying the Mean Decomposition

Dependent Variable: Log [Self-Reported Productivity (Birr/HA)]

	Pooled Sample	*Male Manager*	*Female Manager*
Manager Characteristics			
Female †	-0.1348	.	.
	(0.0898)		
Age (years)	0.0016	0.0004	0.0008
	(0.0023)	(0.0024)	(0.0055)
Years of Schooling	0.0094	0.0062	0.0886*
	(0.0139)	(0.0140)	(0.0451)
Manager Disability †	0.0299	0.0066	-0.1010
	(0.0977)	(0.1278)	(0.1449)
Hours per Week for Agriculture Activities	0.0036**	0.0043**	-0.0030
	(0.0017)	(0.0018)	(0.0035)
Access to Extension Program †	0.0701	0.1275	-0.2868*
	(0.0828)	(0.0875)	(0.1728)
Access to Credit Services †	-0.0403	-0.0348	-0.0167
	(0.0746)	(0.0788)	(0.1642)
Manager Land Tenancy			
Log [HA]	-0.2194***	-0.2395***	-0.0249
	(0.0630)	(0.0733)	(0.0890)
Number of Fields Managed	-0.0227**	-0.0193*	-0.0517***
	(0.0093)	(0.0100)	(0.0138)
Total Number of Crops Produced	0.0265	0.0192	0.0863***
	(0.0180)	(0.0195)	(0.0271)
Fields for which HH has a Certificate	0.0069	0.0509	-0.2148
	(0.0802)	(0.0841)	(0.1403)
Manager's Plot Occupation: Rented (% of parcels)	0.6368***	0.6082***	0.7741
	(0.1736)	(0.1820)	(0.5030)
Manager's Plot Characteristics			
Intercropping (% of fields)	0.0709	0.0744	0.0490
	(0.1783)	(0.1911)	(0.2441)
Slope	0.0031	0.0040	-0.0035
	(0.0054)	(0.0055)	(0.0108)
Distance to Household	-0.0032***	-0.0027**	-0.0175**
	(0.0011)	(0.0011)	(0.0078)
Manager's Agricultural Non-Labor Input Use (for Season)			
Fields that Use (% of Total)			
Irrigation	-0.6392***	-0.7571***	0.1814
	(0.2316)	(0.2321)	(0.3085)
Fertilizer	-0.1009	0.0442	-1.2988***
	(0.1739)	(0.1729)	(0.4236)
Organic Fertilizer	0.0861	0.0236	0.8066**
	(0.1829)	(0.1954)	(0.3318)
Pesticide, Herbicide or Fungicide	0.5199***	0.4669**	1.2564***
	(0.1825)	(0.1975)	(0.4219)
Improved Seeds	-0.4844	-0.6947*	-0.0428
	(0.2937)	(0.3542)	(0.4811)
Chemical Fertilizer Used per Hectare (KG/HA)	0.0025***	0.0021***	0.0057***
	(0.0004)	(0.0004)	(0.0014)
Oxen per Hectare	-0.0066	0.0090	-0.1397***
	(0.0154)	(0.0146)	(0.0374)
Agricultural Implement Access Index	0.0346	0.0340	0.0323
	(0.0241)	(0.0262)	(0.0447)
Manager's Agricultural Labor Input Use (for Season)			
Household Male Labor Use ('000 Hours/HA)	0.0193	0.0181	-0.0184
	(0.0178)	(0.0169)	(0.0322)
Household Female Labor Use ('000 Hours /HA)	0.0350	0.0253	0.0673
	(0.0445)	(0.0685)	(0.0449)
Household Child Labor Use ('000 Hours /HA)	-0.1317	-0.4035**	0.2718*
	(0.1259)	(0.1952)	(0.1439)
Total Hired Labor Use ('000 Days/HA)	0.0789	0.0109	-0.4347
	(0.2047)	(0.1942)	(0.6889)
Total Exchange Labor Use ('000 Days/HA)	0.2493	0.8957	-0.1911
	(0.3717)	(0.8486)	(0.1487)

Table 3 (Continued)

	Pooled Sample	*Male Manager*	*Female Manager*
Household Characteristics			
Log [Consumption (Birr)]	0.1197**	0.1353**	0.0241
	(0.0516)	(0.0549)	(0.1046)
Distance to Closest Market (KM)	-0.0041***	-0.0043***	-0.0050**
	(0.0012)	(0.0012)	(0.0023)
Household Size	0.0313**	0.0383**	0.0044
	(0.0151)	(0.0161)	(0.0497)
Dependency Ratio	-0.1416***	-0.1769***	-0.0616
	(0.0486)	(0.0590)	(0.0909)
More than Half of the Household Production Sold †	-0.4102	-0.3439	-0.3692
	(0.2607)	(0.2878)	(0.4014)
Non-agricultural Labor Income †	0.0302	0.0412	-0.0342
	(0.0988)	(0.1069)	(0.1960)
Household Agro-Ecological Zone Classification			
Tropic-Warm/Semiarid †	2.2569***	2.2417***	3.0512***
	(0.3752)	(0.3868)	(0.5237)
Tropic-Cool/Semiarid †	1.2338***	1.0605***	3.2374***
	(0.3369)	(0.3072)	(0.4988)
Tropic-Cool/Subhumid †	1.2831***	1.1364***	3.2379***
	(0.3348)	(0.3076)	(0.4309)
Tropic-Cool/Humid †	0.5064	0.3326	2.4622***
	(0.3527)	(0.3276)	(0.4387)
Shocks			
Crop Damage †	0.0087	-0.0256	-0.0043
	(0.0634)	(0.0681)	(0.1073)
Observations	1,518	1,277	241
R-Squared	0.339	0.344	0.525

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable

Table 4: Decomposition of the Gender Differential in Agricultural Productivity

Agricultural Productivity Proxied by Log [Self-Reported Productivity (Birr/HA)]

A. Mean Gender Differential			
Mean Male Manager Agricultural Productivity			8.502***
			(0.0635)
Mean Female Manager Agricultural Productivity			8.268***
			(0.0935)
Mean Gender Differential in Agricultural Productivity			0.234***
			(0.0889)
B. Aggregate Decomposition	*Endowment Effect*	*Male Structural Advantage*	*Female Structural Disadvantage*
TOTAL	0.101	0	0.134
	(0.0690)	(0.0065)	(0.0826)
Share of Gender Differential	43.16%	0.00%	56.8%
C. Detailed Decomposition	*Endowment Effect*	*Male Structural Advantage*	*Female Structural Disadvantage*
Manager Characteristics			
Age (years)	-0.00595	-0.0545	0.0371
	(0.0086)	(0.0431)	(0.2240)
Years of Schooling	0.0120	-0.00570	-0.0400*
	(0.0175)	(0.0065)	(0.0225)
Manager Disability †	-0.00213	-0.000963	0.0148
	(0.0069)	(0.0029)	(0.0158)
Hours per Week for Agriculture Activities	0.0311*	0.0148	0.0951**
	(0.0160)	(0.0146)	(0.0429)
Access to Extension Program †	0.00291	0.0209*	0.115**
	(0.0043)	(0.0126)	(0.0507)
Access to Credit Services †	-0.00272	0.00146	-0.00483
	(0.0052)	(0.0066)	(0.0297)
Manager Land Tenancy			
Log [HA]	-0.0948***	-0.000690	0.0772**
	(0.0368)	(0.0018)	(0.0379)
Number of Fields Managed	-0.0298	0.0439	0.345**
	(0.0201)	(0.0334)	(0.1497)
Total Number of Crops Produced	0.0189	-0.0542	-0.405**
	(0.0161)	(0.0391)	(0.1709)
Fields for which HH has a Certificate	-0.000350	0.0233*	0.129*
	(0.0041)	(0.0130)	(0.0732)
Manager's Plot Occupation: Rented (% of parcels)	0.0479***	-0.00296	-0.00403
	(0.0147)	(0.0041)	(0.0143)
Manager's Plot Characteristics			
Intercropping (% of fields)	0.00287	0.000735	0.00425
	(0.0074)	(0.0117)	(0.0449)
Slope	0.00366	0.0123	0.0797
	(0.0067)	(0.0167)	(0.1019)
Distance to Household	-0.00350	0.000892	0.0112*
	(0.0022)	(0.0006)	(0.0064)
Manager's Agricultural Non-Labor Input Use (for Season)			
Fields that Use (% of Total)			
Irrigation	-0.00705	-0.00340*	-0.0146**
	(0.0054)	(0.0019)	(0.0069)
Fertilizer	0.00434	0.0684*	0.616***
	(0.0083)	(0.0357)	(0.1968)
Organic Fertilizer	-0.00532	-0.0181	-0.253**
	(0.0115)	(0.0193)	(0.1200)
Pesticide, Herbicide or Fungicide	0.0000924	-0.00519	-0.0720*
	(0.0102)	(0.0069)	(0.0394)
Improved Seeds	0.00132	-0.0102	-0.0226
	(0.0060)	(0.0067)	(0.0256)
Chemical Fertilizer Used per Hectare (KG/HA)	0.0112	-0.0177*	-0.133**
	(0.0200)	(0.0101)	(0.0555)
Oxen per Hectare	-0.00229	0.0200*	0.124***
	(0.0055)	(0.0114)	(0.0418)
Agricultural Implement Access Index	0.0137	-0.000204	-0.000138
	(0.0106)	(0.0037)	(0.0025)

Table 4 (Continued)

C. Detailed Decomposition	*Endowment Effect*	*Male Structural Advantage*	*Female Structural Disadvantage*
Manager's Agricultural Labor Input Use (for Season)			
Household Male Labor Use ('000 Hours/HA)	0.00983	-0.00139	0.0273
	(0.0096)	(0.0117)	(0.0200)
Household Female Labor Use ('000 Hours/HA)	-0.0206	-0.00434	-0.0335
	(0.0274)	(0.0175)	(0.0425)
Household Child Labor Use ('000 Hours/HA)	0.00199	-0.00351	-0.0113*
	(0.0024)	(0.0025)	(0.0067)
Total Hired Labor Use ('000 Days/HA)	-0.000129	-0.00130	0.0106
	(0.0007)	(0.0018)	(0.0126)
Total Exchange Labor Use ('000 Days/HA)	-0.00345	0.0172	0.0178
	(0.0053)	(0.0152)	(0.0158)
Household Characteristics			
Log [Consumption (Birr)]	0.0301**	0.0827	0.482
	(0.0149)	(0.1093)	(0.4510)
Distance to Closest Market (KM)	-0.0206	-0.0117	0.0497
	(0.0155)	(0.0214)	(0.0978)
Household Size	0.0547**	0.0396	0.104
	(0.0264)	(0.0383)	(0.1656)
Dependency Ratio	-0.0186*	-0.0238	-0.0435
	(0.0110)	(0.0175)	(0.0435)
More than Half of the HH Production Sold †	0.0111	0.00161	-0.00210
	(0.0100)	(0.0029)	(0.0169)
Non-agricultural Labor Income †	-0.00152	0.00181	0.0138
	(0.0050)	(0.0060)	(0.0348)
Household Agro-Ecological Zone Classification			
Tropic-Warm/Semiarid †	0.0105	-0.000214	-0.00754
	(0.0077)	(0.0019)	(0.0084)
Tropic-Cool/Semiarid †	0.0272	-0.0476	-0.507***
	(0.0521)	(0.0315)	(0.1401)
Tropic-Cool/Subhumid †	0.0666	-0.0736	-0.882***
	(0.0650)	(0.0566)	(0.1904)
Tropic-Cool/Humid †	-0.0428	-0.0340	-0.550***
	(0.0379)	(0.0235)	(0.1494)
Shocks			
Crop Damage †	0.000373	-0.0150	0.00499
	(0.0027)	(0.0094)	(0.0374)
Observations		1,518	

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable

Table 5: Exploring Heterogeneity by Female Subgroups

	Dependent Variable: Log [Self-Reported Productivity (Birr/HA)]			
	(1)	(2)	(3)	(4)
Female and Marital Status Interactions				
Female x Married †	-0.0395	-0.0395	0.1591	0.1588
	(0.1478)	(0.1479)	(0.1121)	(0.1121)
Female x Not Married †	-0.3015***		-0.2392**	
	(0.1117)		(0.1065)	
Female x Single †		-0.6239***		-0.9145***
		(0.1261)		(0.3068)
Female x Divorced †		-0.2348		-0.4350***
		(0.1728)		(0.1389)
Female x Widowed †		-0.3063**		-0.1697
		(0.1245)		(0.1269)
Baseline Covariates	No	No	Yes	Yes
Observations	1,518	1,518	1,518	1,518
R-Squared	0.009	0.009	0.343	0.345

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable

Table 6: Aggregate Decomposition of the Gender Differential in Agricultural Productivity At Selected Points of the Agricultural Productivity Distribution

Agricultural Productivity Proxied by Log [Self-Reported Productivity (Birr/HA)]

	Mean	*10th Percentile*	*20th Percentile*	*30th Percentile*	*40th Percentile*	*50th Percentile*	*60th Percentile*	*70th Percentile*	*80th Percentile*	*90th Percentile*
A. Gender Differential										
Male Manager Value	8.502***	7.196***	7.686***	8.070***	8.345***	8.628***	8.803***	9.067***	9.311***	9.689***
	(0.0635)	(0.0971)	(0.0997)	(0.0834)	(0.0789)	(0.0702)	(0.0655)	(0.0676)	(0.0606)	(0.0672)
Female Manager Value	8.268***	7.078***	7.525***	7.815***	8.126***	8.373***	8.549***	8.858***	9.106***	9.501***
	(0.0935)	(0.1447)	(0.1396)	(0.1420)	(0.1179)	(0.1021)	(0.1007)	(0.1177)	(0.1088)	(0.1393)
Gender Differential	0.234***	0.118	0.160	0.254*	0.219*	0.255**	0.254**	0.210*	0.205*	0.188
	(0.0889)	(0.1439)	(0.1383)	(0.1379)	(0.1185)	(0.1022)	(0.0991)	(0.1190)	(0.1068)	(0.1422)
B. Aggregate Decomposition										
Endowment Effect	0.101	0.208*	0.137	0.0900	0.0543	0.110	0.122*	0.104	0.0286	0.0623
	(0.0690)	(0.1174)	(0.1116)	(0.0963)	(0.0920)	(0.0760)	(0.0733)	(0.0803)	(0.0811)	(0.1060)
Share of the Gender Differential	43.2%	176.3%	85.6%	35.4%	24.8%	43.1%	48.0%	49.5%	14.0%	33.1%
Male Structural Advantage	0	0	1.78e-15	0	-1.78e-15	0	-1.78e-15	1.78e-15	0	0
	(0.0065)	(0.0105)	(0.0092)	(0.0087)	(0.0085)	(0.0089)	(0.0078)	(0.0091)	(0.0090)	(0.0157)
Share of the Gender Differential	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Female Structural Disadvantage	0.134	-0.0905	0.0237	0.164	0.165	0.145	0.132	0.106	0.176*	0.125
	(0.0826)	(0.1798)	(0.1531)	(0.1282)	(0.1183)	(0.1032)	(0.0939)	(0.1025)	(0.0950)	(0.1349)
Share of the Gender Differential	56.8%	-76.3%	14.4%	64.6%	75.2%	56.9%	52.0%	50.5%	86.0%	66.9%
Observations	1,518									

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Exploring Heterogeneity by Region Subgroups

	Dependent Variable: Log [Self-Reported Productivity (Birr/HA)]			
	(1)	(2) ‡	(3)	(4) ‡
Female and Region Interactions				
Female x Tigray †	0.3312**	-0.0858	0.0505	-0.0222
	(0.1304)	(0.1289)	(0.1580)	(0.1439)
Female x Amhara †	-0.1715	-0.4098**	-0.4148**	-0.4890**
	(0.1685)	(0.1729)	(0.1797)	(0.1903)
Female x Oromiya †	-0.0764	-0.0683	0.1006	0.1220
	(0.2077)	(0.1895)	(0.1249)	(0.1299)
Female x SNNP †	-0.6145***	-0.2828*	-0.0519	0.0119
	(0.1684)	(0.1567)	(0.1378)	(0.1390)
Female x Other Region †	-0.7693	-0.2656	-0.5208*	-0.2466
	(0.4801)	(0.3403)	(0.2926)	(0.3186)
Region Dummies				
Tigray †		0.9207***		0.4946*
		(0.2858)		(0.2625)
Amhara †		0.7421***		0.4544**
		(0.2475)		(0.2002)
Oromiya †		0.4957*		0.2871
		(0.2627)		(0.1955)
SNNP †		0.1721		0.2056
		(0.2924)		(0.2137)
Baseline Covariates	No	No	Yes	Yes
Observations	1,518	1,518	1,518	1,518
R-Squared	0.018	0.069	0.346	0.352

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable
‡ In regressions 2 and 4, dummy variable for Other Region is omitted because of collinearity.

Table 8: Fallow Field Determinants

Dependent Variable:	Fallow Fields (% of Total)		Fallow Field †	
	(1)	(2)	(3)	(4)
Manager Characteristics				
Female †	0.0062	0.0072	0.0087*	0.0111**
	(0.0076)	(0.0075)	(0.0052)	(0.0055)
Age (years)		0.0002		0.0001
		(0.0001)		(0.0001)
Years of Schooling		0.0005		0.0004
		(0.0007)		(0.0007)
Manager Disability †		-0.0110		0.0024
		(0.0070)		(0.0081)
Hours per Week for Agriculture Activities		0.0000		0.0002*
		(0.0002)		(0.0001)
Access to Extension Program †		0.0028		-0.0003
		(0.0082)		(0.0056)
Access to Credit Services †		-0.0033		0.0072
		(0.0056)		(0.0049)
Manager Land Tenancy				
Log [Total Fields HA]		0.0105***		
		(0.0031)		
Log [Field HA]				0.0076***
				(0.0018)
Number of Fields Managed		0.0016***		0.0021***
		(0.0006)		(0.0006)
Total Number of Crops Produced		-0.0032**		-0.0035***
		(0.0013)		(0.0012)
HH Parcel Certificate (% of parcels)		-0.0049		
		(0.0055)		
Parcel Certificate †				-0.0048
				(0.0047)
Manager's Plot Occupation: Rented (% of parcels)		-0.0425***		
		(0.0123)		
Manager's Plot Characteristics				
Average Slope (Total Fields)		0.0001		
		(0.0003)		
Average Distance to Household (Total Fields)		0.0000		
		(0.0000)		
Field Slope				-0.0000
				(0.0002)
Field Distance to Household				-0.0001**
				(0.0000)
Household Characteristics				
Log [Consumption (Birr)]		-0.0110*		-0.0016
		(0.0066)		(0.0043)
Distance to Closest Market (KM)		0.0003***		0.0001*
		(0.0001)		(0.0001)
Household Size		-0.0015		-0.0015
		(0.0011)		(0.0012)
Dependency Ratio		0.0060		0.0051
		(0.0045)		(0.0034)
More than Half of the Household Production Sold †		-0.0057		-0.0070
		(0.0060)		(0.0069)
Non-agricultural Labor Income †		-0.0063		-0.0055
		(0.0049)		(0.0047)
Household Agro-Ecological Zone Classification				
Tropic-Warm/Semiarid †		0.0762***		0.0843**
		(0.0291)		(0.0331)
Tropic-Cool/Semiarid †		0.0006		-0.0007
		(0.0154)		(0.0170)
Tropic-Cool/Subhumid †		0.0010		0.0047
		(0.0142)		(0.0166)
Tropic-Cool/Humid †		-0.0108		-0.0080
		(0.0167)		(0.0170)

Table 8 (Continued)

Dependent Variable:	Fallow Fields (% of Total)		Fallow Field †	
	(1)	(2)	(3)	(4)
Soil Characteristics				
Nutrient Constraint †		0.0228***		0.0199***
		(0.0087)		(0.0076)
Oxygen Constraint †		-0.0028		-0.0149**
		(0.0068)		(0.0068)
Toxicity Constraint †		-0.0084		0.1218***
		(0.0149)		(0.0291)
Observations	1,861	1,861	13,020	13,020
R-Squared	0.001	0.093	0.000	0.023

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable

Figure 1: Female vs. Male Managers' Productivity Distribution

Kernel Density Estimations of Agricultural Productivity

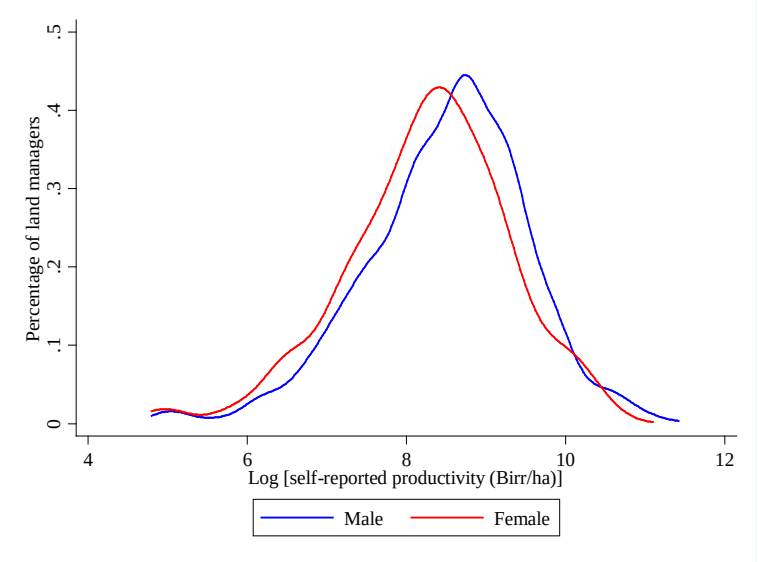
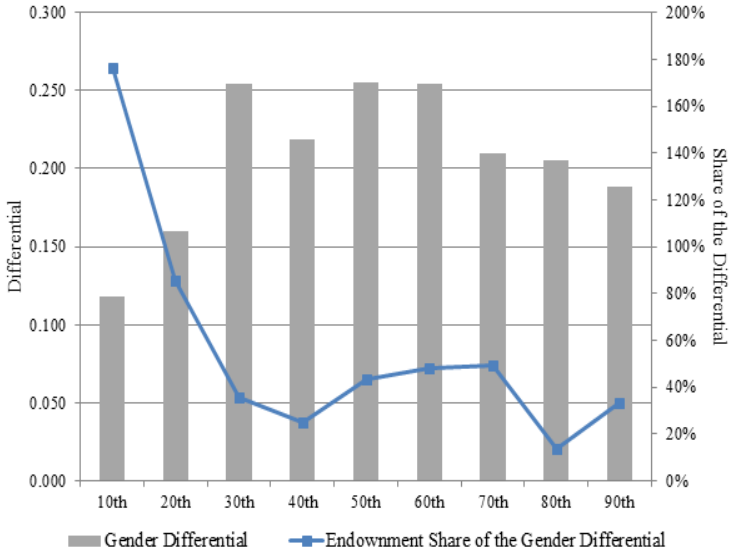


Figure 2: Gender Differential and Endowment Effect

RIF Decomposition Estimations at Deciles of Agricultural Productivity Distribution



Appendix

1. Self-reported variable estimation

This variable, henceforth referred to as "*sfrp_production*" is estimated with information from ERSS Section 11: "Crop disposition." In this section, each manager is asked about the use of their agricultural production on a crop-by-crop basis.[38] The total production (in kilos) for each crop is estimated and then aggregated at manager level using prices.

The basis to estimate the *sfrp_production* variable consists in relating the reported production used in kilos (questions 3, 10-14) with reported proportions of use (question 22).

Two estimates of *sfrp_production* are generated:

a) This estimate is based on a reported share of crop consumed and an estimate of the total quantity of crop produced excluding quantity consumed. First, all reported crop used (in kilos) for different purposes are added, call this quantity X_i. This value X_i corresponds to all the proportions of use except household self-consumption (which is not reported in kilos). Using the proportion for the quantity consumed, call it pc_i , the estimate for total production used (UQ_i^B) is:

$$UQ_i^B = X_i / (1 - pc_i)$$

b) A second approach consists in using the maximum proportion of use reported, assuming that managers report their predominant uses more accurately, call it $pmax_i$.

Then, this maximum proportion is related to its corresponding production use reported in kilos, call this quantity $Xmax_i$. With that relation established total production used, for this second approach (UQ_i^C), is estimated:

$$UQ_i^C = Xmax_i / pmax_i$$

Finally, to estimate the *sfrp_production* ($sfrp\_Q_i$) add the lost production (LQ_i) and stored production (SQ_i) to the production used for each approach:

$$sfrp\_Q_i^B = UQ_i^B + LQ_i + SQ_i$$

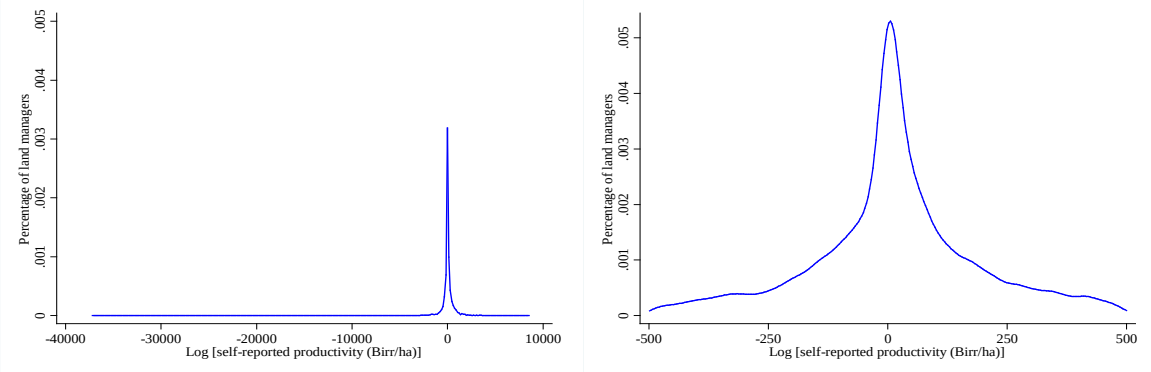
$$sfrp_{Q_i}^{\ C} = UQ_i^C + LQ_i + SQ_i$$

As described before, these quantities are aggregated at the manager level using prices to estimate the value of production generated by each manager.

[38] This also means that the analysis will have to be done at the manager level and not at the plot level, since it is not possible to identify from which plot the crop was collected. Given that several farmers have more than one plot with the same crop, it is necessary to turn to the manager level analysis.

2. Comparison of sfrp_production to crop cut observations

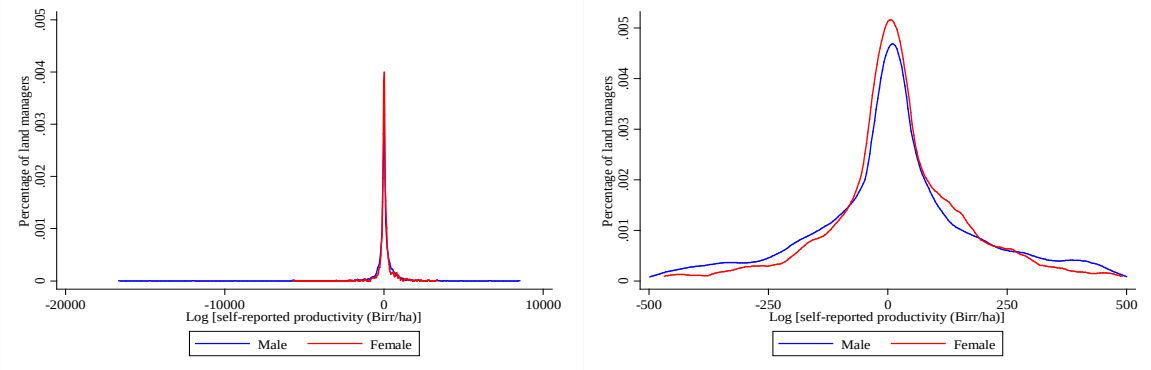
To determine if the *sfrp_production* variable is correctly estimated, the observations available for crop cut are employed. The following graphs illustrate the differences of the *sfrp_production* and the crop cut production. The following kernel densities of the differences show that the *sfrp_production* is satisfactorily estimated. Both graphs illustrate the same density, only the second restrict the errors within 500 kilo difference.



3. Comparison of sfrp_production to crop cut observations by gender

A final concern is if the difference between *sfrp_production* and crop cut, i.e. the error of the self-reported production is different by gender. For instance, if males tend to over report production more than females, we would have a concern to use *sfrp_production* in the gender analysis of differences in productivity.

The following graphs show the kernel densities illustrated above on a gender basis. The red density corresponds to female managers and the blue to males. The graphs show that both densities are centered in zero. Females seem to be slightly better reporting *sfrp_production*, which is consistent with females having smaller plots.



A final test consists in estimating an OLS of the difference versus gender. The results shown below show that this average difference is small and not significant.

$$sfrp^{B}_{Q_i} - cropcut_{Q_i} = 43.9 + 5.26 female_i$$
$$(4.09)\ (10.72)$$

Table A.1: Descriptive Statistics & Mean Differences by Sample Selection, Pooled Sample

		Panel I *Production Restriction*			Panel II *Outlier Restriction*			Panel III *Covariate Restriction*		
	(A) *Total Sample*	(B) *In-sample*	(C) *Out-of-Sample*	(B -C) *Difference*	(D) *In-sample*	(E) *Out-of-Sample*	(D-E) *Difference*	(F) *In-sample*	(G) *Out-of-Sample*	(F-G) *Difference*
Outcome Variable										
Self-Reported Productivity (Birr/HA)	9398.7	9398.7	.	.	7738.8	122797.4	-115058.6***	7509.0	8205.0	-696.0
Log (Self-Reported Productivity)	8.468	8.468	.	.	8.489	7.053	1.436	8.467	8.535	-0.0687
Manager Characteristics										
Age (years)	43.93	44.34	42.13	2.215**	44.33	45.02	-0.684	45.24	42.49	2.750***
Relationship to Household Head										
Head †	0.948	0.972	0.846	0.126***	0.971	1.000	-0.0287***	0.987	0.940	0.0471***
Spouse †	0.0125	0.00678	0.0373	-0.0305***	0.00688	-1.30e-17	0.00688***	0.00513	0.0104	-0.00531
Son/Daughter †	0.0300	0.0165	0.0881	-0.0716***	0.0167	-8.67e-17	0.0167***	0.00555	0.0394	-0.0339***
Other Relative †	0.00671	0.00283	0.0233	-0.0205**	0.00287	1.30e-17	0.00287*	0.00253	0.00357	-0.00104
No Relationship †	0.00284	0.00221	0.00552	-0.00331	0.00224	-1.47e-17	0.00224	-1.65e-17	0.00682	-0.00682
Religion										
Orthodox †	0.476	0.505	0.347	0.158***	0.506	0.418	0.0882	0.512	0.494	0.0181
Protestant †	0.227	0.226	0.231	-0.00496	0.223	0.396	-0.173	0.223	0.224	-0.00164
Muslim †	0.260	0.240	0.347	-0.107***	0.241	0.186	0.0548	0.246	0.230	0.0159
Other †	0.0379	0.0293	0.0753	-0.0460***	0.0298	7.29e-17	0.0298***	0.0191	0.0515	-0.0324***
Marital Status										
Single †	0.0444	0.0334	0.0928	-0.0594***	0.0338	0.00921	0.0246***	0.0211	0.0597	-0.0386***
Married †	0.802	0.828	0.690	0.139***	0.829	0.755	0.0744	0.844	0.799	0.0446**
Divorced †	0.0436	0.0409	0.0557	-0.0148	0.0399	0.103	-0.0634	0.0309	0.0584	-0.0276**
Widowed †	0.110	0.0976	0.162	-0.0643***	0.0971	0.133	-0.0356	0.104	0.0826	0.0216
Illiteracy †	0.578	0.584	0.551	0.0326	0.584	0.602	-0.0184	0.588	0.575	0.0134
Years of Schooling	1.712	1.621	2.102	-0.481***	1.633	0.805	0.828***	1.579	1.746	-0.167
Days Self-Reported Sick within Last Month	4.011	3.963	4.220	-0.257	3.943	5.338	-1.395	3.857	4.118	-0.261
Manager Disability †	0.0516	0.0537	0.0428	0.0109	0.0529	0.104	-0.0513	0.0528	0.0532	-0.000392
Hours per Week for Agriculture Activities	19.84	20.65	16.28	4.377***	20.73	15.14	5.591**	21.69	18.77	2.918***
Access to Extension Program †	0.338	0.347	0.292	0.0552*	0.350	0.128	0.222***	0.357	0.337	0.0197
Access to Credit Services †	0.241	0.264	0.136	0.128***	0.268	0.0238	0.244***	0.261	0.283	-0.0221
Access to Advisory Services †	0.670	0.696	0.550	0.146***	0.700	0.464	0.235**	0.704	0.690	0.0147
Manager Land Tenancy										
Total Land Managed (Hectares)	1.197	1.311	0.712	0.599***	1.312	1.215	0.0977	1.389	1.157	0.232***
Number of Fields Managed	11.30	12.20	7.453	4.746***	12.19	13.15	-0.961	13.02	10.50	2.523***
Total Number of Tree Bearing Fruit	182.7	168.8	256.9	-88.13*	169.4	118.3	51.13	176.2	154.7	21.48
Total Number of Crops Produced	6.513	6.879	4.563	2.316***	6.868	7.789	-0.921	7.378	5.775	1.603***
Manager's Plot Certification (% of Total Fields)										
Fields for which HH has a Certificate	0.502	0.535	0.321	0.213***	0.535	0.519	0.0162	0.535	0.533	0.00220
Fields for which Manager Owns the Certificate	0.473	0.506	0.291	0.215***	0.507	0.476	0.0303	0.509	0.499	0.00982

Table A.1 (Continued)

		Panel I *Production Restriction*			Panel II *Outlier Restriction*			Panel III *Covariate Restriction*		
	(A)	**(B)**	**(C)**	**(B -C)**	**(D)**	**(E)**	**(D-E)**	**(F)**	**(G)**	**(F-G)**
	Total Sample	*In-sample*	*Out-of-Sample*	*Difference*	*In-sample*	*Out-of-Sample*	*Difference*	*In-sample*	*Out-of-Sample*	*Difference*
Manager's Plot Occupation (% of parcels)										
Granted by Local Leaders	0.366	0.388	0.266	0.122***	0.388	0.367	0.0210	0.449	0.264	0.185***
Inherited	0.403	0.399	0.420	-0.0210	0.400	0.349	0.0512	0.416	0.367	0.0485*
Rented	0.0984	0.107	0.0574	0.0500***	0.107	0.130	-0.0229	0.0935	0.135	-0.0412***
Invasion Without Permission	0.0365	0.0240	0.0943	-0.0704***	0.0237	0.0397	-0.0160	0.00504	0.0617	-0.0567***
Other	0.0962	0.0817	0.163	-0.0809***	0.0812	0.115	-0.0333	0.0364	0.172	-0.136***
Manager's Plot Characteristics										
Intercropping (% of fields)	0.209	0.223	0.147	0.0761***	0.224	0.176	0.0480	0.244	0.184	0.0593***
Crop Rotation †	0.800	0.818	0.709	0.109***	0.819	0.784	0.0346	0.829	0.799	0.0299
Elevation (m)	1970.6	1973.3	1956.6	16.64	1974.2	1900.5	73.69	2003.1	1900.7	102.4***
Wetness Index	12.72	12.64	13.10	-0.458***	12.64	12.54	0.104	12.62	12.71	-0.0949
Slope	12.38	12.58	11.38	1.196**	12.57	12.87	-0.301	13.06	11.33	1.733***
Distance to Household	2.880	2.477	4.946	-2.469	2.501	0.502	1.999***	1.715	4.501	-2.786*
Manager's Agricultural Non-Labor Input Use (for Season)										
Fields that Use (% of Total)										
Irrigation	0.0285	0.0255	0.0449	-0.0194	0.0257	0.00710	0.0186***	0.0271	0.0228	0.00430
Fertilizer	0.482	0.486	0.457	0.0294	0.486	0.488	-0.00196	0.478	0.504	-0.0268
Organic Fertilizer	0.291	0.294	0.279	0.0147	0.293	0.315	-0.0218	0.298	0.284	0.0141
Crops that Use (% of Total)										
Pesticide	0.0233	0.0216	0.0324	-0.0108	0.0217	0.00991	0.0118	0.0202	0.0249	-0.00469
Herbicide	0.0893	0.0808	0.134	-0.0535***	0.0815	0.0248	0.0567***	0.0820	0.0804	0.00154
Fungicide	0.00859	0.00883	0.00732	0.00152	0.00894	4.16e-17	0.00894***	0.00587	0.0155	-0.00968**
Pesticide, Herbicide or Fungicide	0.105	0.0983	0.143	-0.0450**	0.0990	0.0347	0.0643***	0.0980	0.101	-0.00332
Improved Seeds	0.0497	0.0507	0.0439	0.00684	0.0508	0.0463	0.00447	0.0487	0.0551	-0.00640
Chemical Fertilizer Used per Hectare (KG/HA)	43.78	46.70	30.31	16.39***	46.61	53.20	-6.597	45.31	49.24	-3.934
Oxen per Hectare	1.616	1.534	2.053	-0.519	1.438	9.782	-8.344	1.229	1.951	-0.721
Agricultural Implement Access Index	0.169	0.240	-0.181	0.421***	0.248	-0.322	0.570*	0.276	0.164	0.112
Manager's Agricultural Labor Input Use (for Season)										
Manager Labor (Hours/HA)	1058.0	1001.9	1639.9	-638.0**	970.0	3418.2	-2448.2*	990.2	928.8	61.37
Household Male Labor Use (Hours/HA)	1189.4	1149.2	1607.5	-458.4	1115.8	3679.0	-2563.1	1164.3	1016.7	147.6
Household Female Labor Use (Hours/HA)	602.1	559.0	1049.5	-490.4***	547.5	1433.4	-885.9**	494.9	654.9	-160.0**
Household Child Labor Use (Hours/HA)	15.72	15.04	22.73	-7.689	13.88	103.2	-89.28	15.30	10.98	4.326
Hired Male Labor Use (Days/HA)	17.63	18.26	11.02	7.238	16.92	120.1	-103.2*	14.87	21.11	-6.247
Hired Female Labor Use (Days/HA)	3.153	3.407	0.509	2.899***	3.125	24.82	-21.69	3.757	1.832	1.925*
Hired Child Labor Use (Days/HA)	0.431	0.473	-3.11e-15	0.473**	0.473	0.462	0.0115	0.621	0.170	0.451
Exchange Male Labor Use (Days/HA)	23.31	23.39	22.47	0.922	23.00	52.61	-29.60*	23.70	21.57	2.129
Exchange Female Labor Use (Days/HA)	4.581	4.565	4.739	-0.174	4.315	23.56	-19.24*	4.483	3.970	0.513
Exchange Child Labor Use (Days/HA)	0.689	0.711	0.454	0.257	0.667	4.063	-3.396	0.543	0.922	-0.379

Table A.1 (Continued)

		Panel I *Production Restriction*			**Panel II** *Outlier Restriction*			**Panel III** *Covariate Restriction*		
	(A)	**(B)**	**(C)**	**(B -C)**	**(D)**	**(E)**	**(D-E)**	**(F)**	**(G)**	**(F-G)**
	Total Sample	*In-sample*	*Out-of-Sample*	*Difference*	*In-sample*	*Out-of-Sample*	*Difference*	*In-sample*	*Out-of-Sample*	*Difference*
Household Characteristics										
Weekly Vale of Household (Birr)										
Food Consumption	223.2	221.0	232.4	-11.42	221.2	207.2	14.06	227.5	208.5	18.93**
Food Self-Produced Consumption	140.4	142.9	129.9	13.04*	143.4	107.2	36.27***	150.5	129.1	21.44***
Consumption Self-Produced (% of Total)	0.608	0.627	0.530	0.0971***	0.628	0.523	0.105*	0.647	0.591	0.0559***
Average Adult's Meals per Day	2.780	2.785	2.760	0.0250	2.785	2.766	0.0197	2.807	2.740	0.0675**
Wealth Index	-0.147	-0.145	-0.154	0.00896	-0.141	-0.408	0.267**	-0.103	-0.218	0.115
Assistance: PSNP †	0.0355	0.0321	0.0499	-0.0178*	0.0319	0.0434	-0.0115	0.0299	0.0362	-0.00629
Assistance: Other †	0.110	0.102	0.144	-0.0421**	0.103	0.0114	0.0919***	0.106	0.0973	0.00876
HH ever received formal credit †	0.101	0.103	0.0896	0.0137	0.105	0.0227	0.0818***	0.112	0.0891	0.0227
Distance to (KM)										
Closest Road	14.90	14.79	15.34	-0.553	14.81	13.75	1.056	15.19	14.02	1.170
Closest Populated Center	35.80	34.63	40.78	-6.149***	34.60	36.69	-2.088	34.24	35.35	-1.106
Closest Market	64.24	60.52	80.02	-19.50***	60.35	71.94	-11.59	59.30	62.51	-3.214
Household Size	5.236	5.248	5.186	0.0623	5.252	4.975	0.277	5.328	5.096	0.232**
Dependency Ratio	0.677	0.674	0.689	-0.0150	0.671	0.851	-0.180	0.654	0.706	-0.0526
More than Half of the HH Production Sold †	0.0430	0.0425	0.122	-0.0794	0.0415	0.112	-0.0701	0.0287	0.0676	-0.0389***
Non-agricultural Labor Income †	0.162	0.169	0.136	0.0333*	0.166	0.385	-0.220**	0.170	0.157	0.0136
Household Agro-Ecological Zone Classification										
Tropic-Warm/Arid †	0.00469	0.000576	0.0221	-0.0216***	0.000584	7.91e-18	0.000584**	0.000128	0.00152	-0.00139*
Tropic-Warm/Semiarid †	0.0318	0.0262	0.0557	-0.0295***	0.0260	0.0385	-0.0125	0.0134	0.0519	-0.0386***
Tropic-Warm/Subhumid †	0.0116	0.0112	0.0133	-0.00203	0.0113	0.00418	0.00715*	0.0118	0.0104	0.00143
Tropic-Warm/Humid †	0.000930	0.000492	0.00279	-0.00230	0.000499	5.53e-18	0.000499*	1.73e-18	0.00152	-0.00152*
Tropic-Cool/Arid †	0.000564	-3.47e-18	0.00296	-0.00296***	0	0	0	0	0	0
Tropic-Cool/Semiarid †	0.232	0.248	0.165	0.0832***	0.250	0.122	0.128***	0.271	0.206	0.0652***
Tropic-Cool/Subhumid †	0.540	0.528	0.588	-0.0593**	0.527	0.631	-0.104	0.495	0.593	-0.0983***
Tropic-Cool/Humid †	0.178	0.185	0.151	0.0345*	0.185	0.204	-0.0194	0.209	0.136	0.0731***
Shocks										
Crop Damage †	0.352	0.394	0.173	0.221***	0.395	0.347	0.0476	0.428	0.327	0.101***

*** p<0.01, ** p<0.05, * p<0.1.
† Denotes a Dummy Variable

Table A.2: Naïve Regression Results on Gender Differences in Agricultural Productivity by Sample Selection

	Dependent Variable: Log [Self-Reported Productivity (Birr/HA)]				
	(1)	(2)	(3)	(4)	(5)
Panel I: Total Sample with Some Production Reported					
Female Manager †	-0.1508	-0.0335	-0.0356	-0.0356	-0.0178
	(0.0916)	(0.0723)	(0.0732)	(0.0732)	(0.0944)
Observations	2,388	2,388	2,388	2,388	2,388
R-Squared	0.051	0.471	0.481	0.481	0.157
Panel II: Without Outliers (1st and 99th percentile)					
Female Manager †	-0.2537***	-0.1345**	-0.1361**	-0.1361**	-0.1492*
	(0.0849)	(0.0674)	(0.0682)	(0.0682)	(0.0808)
Observations	2,340	2,340	2,340	2,340	2,340
R-Squared	0.056	0.489	0.498	0.498	0.167
Panel III: Without Outliers (5th and 95th percentile)					
Female Manager †	-0.1579**	-0.0986	-0.0993	-0.0993	-0.1047*
	(0.0678)	(0.0614)	(0.0623)	(0.0623)	(0.0630)
Observations	2,149	2,149	2,149	2,149	2,149
R-Squared	0.075	0.499	0.507	0.507	0.164
Panel IV: Sample Selection					
Female Manager †	-0.2461***	-0.1210	-0.1265	-0.1265	-0.1891**
	(0.0922)	(0.0852)	(0.0864)	(0.0864)	(0.0879)
Observations	1,518	1,518	1,518	1,518	1,518
R-Squared	0.071	0.554	0.561	0.561	0.185
Fixed Effects	Region	Woreda	Kebele	EA	Product Dummies

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
† Denotes a Dummy Variable

Table A.3: Detailed Decomposition of the Gender Differential in Agricultural Productivity At Selected Points of the Agricultural Productivity Distribution

Agricultural Productivity Proxied by Log [Self-Reported Productivity (Birr/HA)]

A. Gender Differential	**10th Percentile**	**50th Percentile**	**90th Percentile**
Male Manager Value	7.196***	8.628***	9.689***
	(0.0971)	(0.0702)	(0.0672)
Female Manager Value	7.078***	8.373***	9.501***
	(0.1447)	(0.1021)	(0.1393)
Gender Differential	0.118	0.255**	0.188
	(0.1439)	(0.1022)	(0.1422)

B. Aggregate Decomposition	*Endowment Effect*			*Male Structural Advantage*			Female Structural Disadvantage		
	10th	*50th*	*90th*	*10th*	*50th*	*90th*	*10th*	*50th*	*90th*
TOTAL	0.208*	0.110	0.0286	0	0	0	-0.0905	0.145	0.125
	(0.1174)	(0.0760)	(0.0811)	(0.0105)	(0.0089)	(0.0090)	(0.1798)	(0.1032)	(0.1349)
Share of Gender Differential	176.3%	43.1%	33.1%	0.0%	0.0%	0.0%	-76.3%	56.9%	66.9%

C. Detailed Decomposition	*Endowment Effect*			*Male Structural Advantage*			Female Structural Disadvantage		
	10th	*50th*	*90th*	*10th*	*50th*	*90th*	*10th*	*50th*	*90th*
Manager Characteristics									
Age (years)	-0.0168	-0.0115	0.0102	0.0314	-0.0812	-0.0681	0.848**	0.123	-0.854**
	(0.0145)	(0.0106)	(0.0142)	(0.0814)	(0.0611)	(0.0864)	(0.4050)	(0.3007)	(0.4238)
Years of Schooling	0.0444	0.0143	-0.0200	0.00473	-0.00699	-0.0104	-0.0173	-0.0197	-0.103*
	(0.0314)	(0.0188)	(0.0291)	(0.0085)	(0.0078)	(0.0187)	(0.0298)	(0.0275)	(0.0579)
Manager Disability †	-0.0102	-0.0120	-0.00586	-0.00699	-0.00339	0.00252	0.0131	0.0107	0.0200
	(0.0124)	(0.0101)	(0.0142)	(0.0053)	(0.0039)	(0.0063)	(0.0293)	(0.0199)	(0.0346)
Hours per Week for Agriculture Activities	0.0390	0.0463**	0.0421*	-0.00229	0.00362	0.0412*	0.0572	0.0512	0.179**
	(0.0268)	(0.0198)	(0.0255)	(0.0269)	(0.0164)	(0.0233)	(0.0898)	(0.0537)	(0.0806)
Access to Extension Program †	0.00786	0.00512	0.00320	0.0466*	0.0258**	0.00161	0.227**	0.162**	0.0360
	(0.0091)	(0.0061)	(0.0057)	(0.0243)	(0.0130)	(0.0203)	(0.1004)	(0.0633)	(0.0857)
Access to Credit Services †	-0.00372	-0.00282	-0.00319	-0.00202	0.00506	-0.000456	-0.0227	0.00733	-0.0390
	(0.0099)	(0.0059)	(0.0084)	(0.0121)	(0.0079)	(0.0138)	(0.0563)	(0.0391)	(0.0663)
Manager Land Tenancy									
Log [HA]	-0.0626	-0.0965***	-0.0924**	-0.000570	-0.00111	-0.00149	0.0837	0.106**	0.0604
	(0.0495)	(0.0372)	(0.0427)	(0.0018)	(0.0026)	(0.0037)	(0.0635)	(0.0517)	(0.0648)
Number of Fields Managed	-0.0574	-0.0192	-0.0130	0.0594	0.0646	0.0405	0.582	0.438**	0.313
	(0.0399)	(0.0158)	(0.0149)	(0.1086)	(0.0415)	(0.0562)	(0.4818)	(0.2081)	(0.2319)
Total Number of Crops Produced	0.0434	0.000968	0.00481	-0.119	-0.0806*	0.0107	-0.893**	-0.440**	-0.272
	(0.0359)	(0.0122)	(0.0154)	(0.0883)	(0.0421)	(0.0763)	(0.4391)	(0.2220)	(0.3286)
Fields for which HH has a Certificate	-0.00536	-0.00388	0.00537	0.0172	0.0301*	0.0200	0.106	0.127	0.0749
	(0.0077)	(0.0058)	(0.0076)	(0.0267)	(0.0178)	(0.0240)	(0.1442)	(0.0999)	(0.1299)
Manager's Plot Occupation:	0.0587**	0.0556***	0.0389	0.00218	0.0000845	-0.00153	0.0190	0.00237	0.00953
Rented (% of parcels)	(0.0247)	(0.0166)	(0.0258)	(0.0099)	(0.0062)	(0.0091)	(0.0370)	(0.0229)	(0.0257)

Table A.3 (Continued)

C. Detailed Decomposition	*Endowment Effect*			*Male Structural Advantage*			Female Structural Disadvantage		
	10th	*50th*	*90th*	*10th*	*50th*	*90th*	*10th*	*50th*	*90th*
Manager's Plot Characteristics									
Intercropping (% of fields)	0.00525	0.0155	0.00289	0.00665	0.0301*	-0.0501*	0.0951	0.0859	-0.184*
	(0.0099)	(0.0134)	(0.0115)	(0.0190)	(0.0163)	(0.0267)	(0.0946)	(0.0749)	(0.0949)
Slope	-0.00745	0.00473	0.00123	0.0349	0.0229	-0.0201	0.183	0.146	-0.383*
	(0.0140)	(0.0065)	(0.0097)	(0.0299)	(0.0172)	(0.0447)	(0.1979)	(0.1039)	(0.2107)
Distance to Household	-0.00288	-0.00361	-0.000141	0.00139	0.00111	-0.00110	0.0297	0.00141	0.00432
	(0.0035)	(0.0024)	(0.0019)	(0.0010)	(0.0007)	(0.0010)	(0.0318)	(0.0074)	(0.0138)
Manager's Agricultural Non-Labor Input Use (for Season)									
Fields that Use (% of Total)									
Irrigation	-0.00152	-0.00746	-0.00759	-0.00322	-0.00209	-0.00749	-0.0187	0.000647	-0.00498
	(0.0040)	(0.0056)	(0.0060)	(0.0038)	(0.0022)	(0.0048)	(0.0124)	(0.0103)	(0.0114)
Fertilizer	-0.00772	0.00953	0.0279	0.0412	0.0755	0.0315	0.613*	0.422	0.467
	(0.0133)	(0.0128)	(0.0259)	(0.0539)	(0.0475)	(0.0588)	(0.3421)	(0.2570)	(0.3678)
Organic Fertilizer	0.0227	-0.00819	-0.0336	-0.0477	-0.0211	0.00612	-0.435*	-0.106	-0.202
	(0.0235)	(0.0142)	(0.0257)	(0.0387)	(0.0297)	(0.0489)	(0.2385)	(0.1682)	(0.2674)
Pesticide, Herbicide or Fungicide	0.000118	0.000132	-0.0000293	-0.0130	0.00522	0.000553	-0.183**	-0.0130	0.0368
	(0.0130)	(0.0146)	(0.0032)	(0.0094)	(0.0094)	(0.0095)	(0.0769)	(0.0395)	(0.0815)
Improved Seeds	0.00184	0.000547	0.00208	-0.00897	-0.0121*	-0.00617	-0.0216	-0.0293	0.0266
	(0.0085)	(0.0026)	(0.0095)	(0.0171)	(0.0064)	(0.0097)	(0.0692)	(0.0267)	(0.0391)
Chemical Fertilizer Used per Hectare (KG/HA)	0.00691	0.0113	0.0171	-0.0220	-0.0188*	0.0181	-0.187**	-0.161**	0.0442
	(0.0127)	(0.0200)	(0.0306)	(0.0161)	(0.0101)	(0.0195)	(0.0912)	(0.0742)	(0.1276)
Oxen per Hectare	-0.0114	-0.00524	0.00312	0.0299	0.0126	0.00484	0.189***	0.0613*	0.0562
	(0.0116)	(0.0059)	(0.0104)	(0.0204)	(0.0080)	(0.0137)	(0.0663)	(0.0346)	(0.0451)
Agricultural Implement Access Index	-0.000307	0.0163	0.0187	0.00827	0.00373	-0.0106	-0.00636	-0.00217	0.0112
	(0.0255)	(0.0123)	(0.0182)	(0.0067)	(0.0049)	(0.0085)	(0.0174)	(0.0067)	(0.0300)
Manager's Agricultural Labor Input Use (for Season)									
Household Male Labor Use	0.00597	0.0152	0.0128	0.0143	-0.0152*	0.00678	0.0833**	0.00892	0.0529
('000 Hours/HA)	(0.0210)	(0.0118)	(0.0174)	(0.0207)	(0.0092)	(0.0260)	(0.0398)	(0.0210)	(0.0524)
Household Female Labor Use	0.0243	-0.00487	-0.0876	0.0109	0.0218	-0.0829*	-0.0921	0.0206	-0.211*
('000 Hours/HA)	(0.0300)	(0.0284)	(0.0707)	(0.0197)	(0.0160)	(0.0439)	(0.0678)	(0.0647)	(0.1115)
Household Child Labor Use	-0.00450	0.00616	0.00801	-0.00499	-0.00518	-0.00357	-0.0138	-0.0117*	-0.0177
('000 Hours/HA)	(0.0044)	(0.0057)	(0.0075)	(0.0035)	(0.0034)	(0.0038)	(0.0094)	(0.0068)	(0.0135)
Total Hired Labor Use ('000 Days/HA)	0.000113	0.000142	-0.000645	0.000360	-0.00237	-0.000908	0.0292	0.000278	0.0695*
	(0.0008)	(0.0007)	(0.0034)	(0.0028)	(0.0019)	(0.0049)	(0.0384)	(0.0158)	(0.0418)
Total Exchange Labor Use	-0.00309	0.000425	-0.0167	0.00621	0.0205*	0.0548*	0.00584	0.0175	0.0583
('000 Days/HA)	(0.0058)	(0.0038)	(0.0156)	(0.0224)	(0.0120)	(0.0330)	(0.0158)	(0.0152)	(0.0389)
Household Characteristics									
Log [Consumption (Birr)]	0.0331	0.0310**	0.0193	0.158	0.0831	0.00843	1.405	0.609	-0.686
	(0.0321)	(0.0158)	(0.0176)	(0.1929)	(0.1649)	(0.1843)	(0.9380)	(0.6384)	(0.8546)
Distance to Closest Market (KM)	-0.0284	-0.0130	-0.00841	-0.0262	0.0152	0.00795	0.119	0.142	0.131
	(0.0234)	(0.0115)	(0.0090)	(0.0308)	(0.0217)	(0.0370)	(0.1937)	(0.1289)	(0.2041)
Household Size	0.0641	0.0133	0.134**	-0.00389	0.0448	0.0614	0.0155	0.162	0.0209
	(0.0543)	(0.0318)	(0.0525)	(0.0656)	(0.0430)	(0.0703)	(0.3060)	(0.1949)	(0.2854)

Table A.3 (Continued)

C. Detailed Decomposition	*Endowment Effect*			*Male Structural Advantage*			Female Structural Disadvantage		
	10th	*50th*	*90th*	*10th*	*50th*	*90th*	*10th*	*50th*	*90th*
Dependency Ratio	-0.0287	-0.00894	-0.0233	-0.00772	-0.0312	-0.0249	0.00597	-0.0329	-0.0541
	(0.0217)	(0.0080)	(0.0158)	(0.0423)	(0.0197)	(0.0301)	(0.1048)	(0.0547)	(0.0664)
More than Half of the HH Production Sold †	0.0198	0.00432	-0.00177	0.00431	0.00501	0.00302	0.0125	0.0109	0.00619
	(0.0183)	(0.0080)	(0.0128)	(0.0062)	(0.0040)	(0.0049)	(0.0407)	(0.0170)	(0.0410)
Non-agricultural Labor Income †	0.00760	-0.00943	-0.00505	-0.00722	-0.000906	0.0193**	-0.0388	0.0109	0.0909
	(0.0119)	(0.0082)	(0.0085)	(0.0123)	(0.0092)	(0.0088)	(0.0710)	(0.0532)	(0.0581)
Household Agro-Ecological Zone Classification									
Tropic-Warm/Semiarid †	0.0153	0.00803	0.00478	-0.00296	0.00172	-0.000327	-0.0271	0.00673	-0.00421
	(0.0116)	(0.0059)	(0.0040)	(0.0039)	(0.0020)	(0.0016)	(0.0282)	(0.0079)	(0.0076)
Tropic-Cool/Semiarid †	0.0589	0.0154	0.00711	-0.0658	-0.0277	-0.0222	-0.819***	-0.322***	-0.0373
	(0.1130)	(0.0296)	(0.0140)	(0.0563)	(0.0220)	(0.0238)	(0.2580)	(0.1084)	(0.1081)
Tropic-Cool/Subhumid †	0.132	0.0418	0.0197	-0.103	-0.0624	-0.0433	-1.405***	-0.601***	-0.319*
	(0.1310)	(0.0411)	(0.0204)	(0.1026)	(0.0418)	(0.0358)	(0.3857)	(0.1602)	(0.1774)
Tropic-Cool/Humid †	-0.136	0.00238	-0.00000499	-0.0619	-0.0276	-0.0194	-1.022***	-0.375***	-0.0688
	(0.1035)	(0.0203)	(0.0143)	(0.0438)	(0.0198)	(0.0200)	(0.3139)	(0.1201)	(0.1150)
Shocks									
Crop Damage †	0.00482	-0.00157	-0.00193	-0.0128	-0.0152	-0.0250	0.0531	-0.0371	-0.0401
	(0.0076)	(0.0036)	(0.0047)	(0.0170)	(0.0140)	(0.0204)	(0.0863)	(0.0565)	(0.0768)
Observations	1,518								

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
† Denotes a Dummy Variable

Table A.4: Exploring the Presence of Omitted Variable Bias in Base OLS Regression Results Underlying the Mean Decomposition, Pooled Sample

Dependent Variable: Log [Self-Reported Productivity (Birr/HA)]

		Category of Additional Covariates Integrated into the Base Regression				
	Base	*Other Manager Characteristics*	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Manager Characteristics						
Female †	-0.1348	-0.1253	-0.1526	-0.1599*	-0.1340	-0.1297
	(0.0898)	(0.0926)	(0.0932)	(0.0925)	(0.0856)	(0.0913)
Age (years)	0.0016	0.0036	0.0004	0.0014	0.0003	0.0001
	(0.0023)	(0.0098)	(0.0024)	(0.0023)	(0.0022)	(0.0021)
Years of Schooling	0.0094	0.0019	0.0088	0.0091	0.0049	0.0004
	(0.0139)	(0.0155)	(0.0139)	(0.0138)	(0.0117)	(0.0125)
Manager Disability †	0.0299	0.0421	0.0344	0.0221	0.1133	0.0657
	(0.0977)	(0.1031)	(0.0987)	(0.0975)	(0.1063)	(0.0898)
Hours per Week for Agriculture Activities	0.0036**	0.0036**	0.0036**	0.0039**	0.0028*	-0.0007
	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0016)	(0.0017)
Access to Extension Program †	0.0701	0.0796	0.0488	0.0830	0.0590	0.1731**
	(0.0828)	(0.0870)	(0.0859)	(0.0811)	(0.0830)	(0.0828)
Access to Credit Services †	-0.0403	-0.0294	-0.0558	-0.0276	-0.0778	-0.0322
	(0.0746)	(0.0754)	(0.0745)	(0.0755)	(0.0689)	(0.0652)
Manager Land Tenancy						
Log [HA]	-0.2194***	-0.2126***	-0.2375***	-0.2461***	-0.3225***	-0.3605***
	(0.0630)	(0.0633)	(0.0612)	(0.0637)	(0.0626)	(0.0617)
Number of Fields Managed	-0.0227**	-0.0234**	-0.0232**	-0.0201**	-0.0145*	0.0070
	(0.0093)	(0.0092)	(0.0094)	(0.0088)	(0.0086)	(0.0109)
Total Number of Crops Produced	0.0265	0.0276	0.0272	0.0231	-0.0334*	0.0337*
	(0.0180)	(0.0176)	(0.0187)	(0.0173)	(0.0189)	(0.0186)
Fields for which HH has a Certificate	0.0069	0.0138	-0.0391	-0.0007	-0.0536	-0.1381*
	(0.0802)	(0.0814)	(0.0746)	(0.0818)	(0.0728)	(0.0734)
Manager's Plot Occupation: Rented (% of parcels)	0.6368***	0.6265***	0.7561***	0.6344***	0.5935***	0.5005***
	(0.1736)	(0.1742)	(0.1790)	(0.1734)	(0.1424)	(0.1709)
Manager's Plot Characteristics						
Intercropping (% of fields)	0.0709	0.0689	0.1368	0.0719	0.3304*	-0.1510
	(0.1783)	(0.1775)	(0.1897)	(0.1752)	(0.1810)	(0.2240)
Slope	0.0031	0.0027	0.0014	0.0018	-0.0022	-0.0073
	(0.0054)	(0.0053)	(0.0056)	(0.0053)	(0.0046)	(0.0049)
Distance to Household	-0.0032***	-0.0032***	-0.0031***	-0.0033***	-0.0023**	-0.0011
	(0.0011)	(0.0011)	(0.0011)	(0.0010)	(0.0010)	(0.0010)

Table A.4 (Continued)

	Base	Category of Additional Covariates Integrated into the Base Regression				
		Other Manager Characteristics	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Manager's Agricultural Non-Labor Input Use (for Season)						
Fields that Use (% of Total)						
Irrigation	-0.6392***	-0.6367***	-0.6107***	-0.6526***	-0.3057	-0.5939***
	(0.2316)	(0.2350)	(0.2111)	(0.2296)	(0.2415)	(0.2109)
Fertilizer	-0.1009	-0.0879	-0.0445	-0.0671	0.0136	0.0434
	(0.1739)	(0.1709)	(0.1815)	(0.1715)	(0.1655)	(0.1440)
Organic Fertilizer	0.0861	0.0723	0.0531	0.0777	0.0538	-0.1376
	(0.1829)	(0.1813)	(0.1942)	(0.1839)	(0.1781)	(0.1449)
Pesticide, Herbicide or Fungicide	0.5199***	0.5262***	0.5467***	0.5226***	0.3535*	0.2842
	(0.1825)	(0.1826)	(0.1905)	(0.1845)	(0.1960)	(0.1875)
Improved Seeds	-0.4844	-0.4500	-0.4748	-0.4424	-0.3085	-0.2187
	(0.2937)	(0.2920)	(0.2968)	(0.3017)	(0.2725)	(0.3579)
Chemical Fertilizer Used per Hectare (KG/HA)	0.0025***	0.0025***	0.0024***	0.0025***	0.0017***	0.0015***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Oxen per Hectare	-0.0066	-0.0068	-0.0102	-0.0105	0.0038	-0.0091
	(0.0154)	(0.0152)	(0.0150)	(0.0152)	(0.0136)	(0.0172)
Agricultural Implement Access Index	0.0346	0.0351	0.0311	0.0364	0.0234	0.0959***
	(0.0241)	(0.0243)	(0.0232)	(0.0249)	(0.0233)	(0.0228)
Manager's Agricultural Labor Input Use (for Season)						
Household Male Labor Use ('000 Hours/HA)	0.0193	0.0201	0.0243	0.0197	0.0261**	0.0164
	(0.0178)	(0.0177)	(0.0165)	(0.0169)	(0.0132)	(0.0159)
Household Female Labor Use ('000 Hours/HA)	0.0350	0.0339	0.0263	0.0316	0.0320	0.0424
	(0.0445)	(0.0448)	(0.0441)	(0.0428)	(0.0389)	(0.0350)
Household Child Labor Use ('000 Hours/HA)	-0.1317	-0.1231	-0.0908	-0.1150	-0.0167	0.0305
	(0.1259)	(0.1254)	(0.1115)	(0.1239)	(0.0865)	(0.0970)
Total Hired Labor Use ('000 Days/HA)	0.0789	0.0644	0.1393	0.1442	0.1958	0.2900
	(0.2047)	(0.1956)	(0.2179)	(0.2180)	(0.2060)	(0.2327)
Total Exchange Labor Use ('000 Days/HA)	0.2493	0.2314	0.2358	0.1830	0.4782	0.8202
	(0.3717)	(0.3624)	(0.3569)	(0.3612)	(0.4702)	(0.5916)
Household Characteristics						
Log [Consumption (Birr)]	0.1197**	0.1151**	0.1131**	0.1205**	0.0879*	0.0499
	(0.0516)	(0.0522)	(0.0511)	(0.0507)	(0.0494)	(0.0490)
Distance to Closest Market (KM)	-0.0041***	-0.0040***	-0.0039***	-0.0051***	-0.0043***	-0.0181**
	(0.0012)	(0.0013)	(0.0012)	(0.0013)	(0.0011)	(0.0074)
Household Size	0.0313**	0.0281*	0.0306**	0.0370**	0.0308**	0.0106
	(0.0151)	(0.0154)	(0.0145)	(0.0151)	(0.0130)	(0.0175)
Dependency Ratio	-0.1416***	-0.1364***	-0.1299***	-0.1392***	-0.1022**	-0.0251
	(0.0486)	(0.0488)	(0.0463)	(0.0476)	(0.0411)	(0.0444)
More than Half of the HH Production Sold †	-0.4102	-0.4166	-0.3604	-0.3567	-0.4895**	-0.3941
	(0.2607)	(0.2616)	(0.2693)	(0.2575)	(0.2440)	(0.2646)
Non-agricultural Labor Income †	0.0302	0.0328	0.0065	-0.0005	-0.0437	-0.1298
	(0.0988)	(0.1001)	(0.0963)	(0.0987)	(0.0901)	(0.0885)

Table A.4 (Continued)

		Category of Additional Covariates Integrated into the Base Regression				
	Base	*Other Manager Characteristics*	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Household Agro-Ecological Zone Classification						
Tropic-Warm/Semiarid †	2.2569***	2.2410***	2.3256***	2.1905***	1.9612***	0.8600
	(0.3752)	(0.3772)	(0.3610)	(0.4261)	(0.4659)	(0.6665)
Tropic-Cool/Semiarid †	1.2338***	1.2247***	1.2714***	1.2901***	0.9020**	0.5056
	(0.3369)	(0.3346)	(0.3417)	(0.3460)	(0.4527)	(0.6810)
Tropic-Cool/Subhumid †	1.2831***	1.2617***	1.2909***	1.3702***	1.1086**	0.0630
	(0.3348)	(0.3331)	(0.3561)	(0.3450)	(0.4480)	(0.3525)
Tropic-Cool/Humid †	0.5064	0.4928	0.5877	0.6041*	0.5383	-0.2806
	(0.3527)	(0.3513)	(0.3663)	(0.3643)	(0.4553)	(0.3942)
Shocks						
Crop Damage †	0.0087	0.0040	0.0069	0.0203	-0.0644	0.0263
	(0.0634)	(0.0636)	(0.0651)	(0.0619)	(0.0581)	(0.0569)
Observations	1,518	1,514	1,518	1,503	1,518	1,518
R-Squared	0.339	0.340	0.349	0.350	0.467	0.635

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable

Table A.5: Exploring the Presence of Omitted Variable Bias in Base OLS Regression Results Underlying the Mean Decomposition, Male Sample

Dependent Variable: Log [Self-Reported Productivity (Birr/HA)]

		Category of Additional Covariates Integrated into the Base Regression				
	Base	*Other Manager Characteristics*	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Manager Characteristics						
Age (years)	0.0004	0.0002	-0.0010	0.0000	-0.0006	-0.0009
	(0.0024)	(0.0120)	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Years of Schooling	0.0062	-0.0031	0.0059	0.0056	0.0044	0.0046
	(0.0140)	(0.0152)	(0.0140)	(0.0137)	(0.0120)	(0.0133)
Manager Disability †	0.0066	0.0146	0.0229	0.0287	0.0459	0.0764
	(0.1278)	(0.1342)	(0.1289)	(0.1265)	(0.1340)	(0.1181)
Hours per Week for Agriculture Activities	0.0043**	0.0043**	0.0044**	0.0045**	0.0032*	-0.0008
	(0.0018)	(0.0018)	(0.0017)	(0.0017)	(0.0016)	(0.0021)
Access to Extension Program †	0.1275	0.1353	0.1081	0.1433	0.0940	0.1999**
	(0.0875)	(0.0913)	(0.0898)	(0.0874)	(0.0823)	(0.0940)
Access to Credit Services †	-0.0348	-0.0225	-0.0572	-0.0178	-0.0702	-0.0259
	(0.0788)	(0.0791)	(0.0796)	(0.0801)	(0.0738)	(0.0702)
Manager Land Tenancy						
Log [HA]	-0.2395***	-0.2326***	-0.2701***	-0.2673***	-0.3471***	-0.3957***
	(0.0733)	(0.0728)	(0.0733)	(0.0765)	(0.0765)	(0.0815)
Number of Fields Managed	-0.0193*	-0.0199**	-0.0199*	-0.0169*	-0.0098	0.0114
	(0.0100)	(0.0100)	(0.0103)	(0.0098)	(0.0104)	(0.0120)
Total Number of Crops Produced	0.0192	0.0200	0.0188	0.0157	-0.0375*	0.0281
	(0.0195)	(0.0191)	(0.0206)	(0.0189)	(0.0218)	(0.0185)
Fields for which HH has a Certificate	0.0509	0.0576	-0.0054	0.0442	-0.0320	-0.1513*
	(0.0841)	(0.0859)	(0.0804)	(0.0874)	(0.0753)	(0.0818)
Manager's Plot Occupation: Rented (% of parcels)	0.6082***	0.5966***	0.7611***	0.5912***	0.5391***	0.3416**
	(0.1820)	(0.1812)	(0.1895)	(0.1819)	(0.1593)	(0.1560)
Manager's Plot Characteristics						
Intercropping (% of fields)	0.0744	0.0726	0.1341	0.0747	0.2850	-0.2229
	(0.1911)	(0.1896)	(0.2041)	(0.1871)	(0.1815)	(0.2473)
Slope	0.0040	0.0036	0.0019	0.0027	-0.0011	-0.0043
	(0.0055)	(0.0055)	(0.0058)	(0.0054)	(0.0048)	(0.0055)
Distance to Household	-0.0027**	-0.0027**	-0.0026**	-0.0028***	-0.0021**	-0.0008
	(0.0011)	(0.0012)	(0.0011)	(0.0010)	(0.0011)	(0.0010)

Table A.5 (Continued)

	Base	Category of Additional Covariates Integrated into the Base Regression				
		Other Manager Characteristics	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Manager's Agricultural Non-Labor Input Use (for Season)						
Fields that Use (% of Total)						
Irrigation	-0.7571***	-0.7535***	-0.7125***	-0.7598***	-0.4548*	-0.6540***
	(0.2321)	(0.2343)	(0.2075)	(0.2262)	(0.2525)	(0.2280)
Fertilizer	0.0442	0.0561	0.1239	0.0714	0.1844	0.1507
	(0.1729)	(0.1701)	(0.1776)	(0.1678)	(0.1568)	(0.1633)
Organic Fertilizer	0.0236	0.0117	-0.0286	0.0085	-0.0109	-0.2421
	(0.1954)	(0.1943)	(0.2085)	(0.1952)	(0.1904)	(0.1660)
Pesticide, Herbicide or Fungicide	0.4669**	0.4723**	0.5100**	0.4707**	0.3065	0.0995
	(0.1975)	(0.1979)	(0.2041)	(0.2044)	(0.1942)	(0.2117)
Improved Seeds	-0.6947*	-0.6492*	-0.7263**	-0.6568*	-0.5570*	-0.3525
	(0.3542)	(0.3505)	(0.3545)	(0.3635)	(0.3337)	(0.4411)
Chemical Fertilizer Used per Hectare (KG/HA)	0.0021***	0.0021***	0.0019***	0.0022***	0.0015***	0.0010**
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Oxen per Hectare	0.0090	0.0087	0.0040	0.0043	0.0123	-0.0001
	(0.0146)	(0.0142)	(0.0143)	(0.0145)	(0.0143)	(0.0186)
Agricultural Implement Access Index	0.0340	0.0349	0.0251	0.0342	0.0178	0.0893***
	(0.0262)	(0.0263)	(0.0258)	(0.0277)	(0.0243)	(0.0251)
Manager's Agricultural Labor Input Use (for Season)						
Household Male Labor Use ('000 Hours/HA)	0.0181	0.0193	0.0252	0.0173	0.0256**	0.0205
	(0.0169)	(0.0169)	(0.0157)	(0.0170)	(0.0123)	(0.0182)
Household Female Labor Use ('000 Hours/HA)	0.0253	0.0219	-0.0002	0.0208	0.0126	0.0373
	(0.0685)	(0.0684)	(0.0675)	(0.0674)	(0.0548)	(0.0771)
Household Child Labor Use ('000 Hours/HA)	-0.4035**	-0.3897**	-0.3059*	-0.3943**	-0.2082	0.0212
	(0.1952)	(0.1970)	(0.1683)	(0.1670)	(0.1518)	(0.1139)
Total Hired Labor Use ('000 Days/HA)	0.0109	-0.0020	0.0721	0.0616	0.0272	0.3741
	(0.1942)	(0.1878)	(0.1956)	(0.1988)	(0.1591)	(0.2801)
Total Exchange Labor Use ('000 Days/HA)	0.8957	0.8638	0.8598	0.7648	1.7678*	1.0023
	(0.8486)	(0.8360)	(0.7840)	(0.8538)	(1.0601)	(0.7064)

Table A.5 (Continued)

		Category of Additional Covariates Integrated into the Base Regression				
	Base	*Other Manager Characteristics*	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Household Characteristics						
Log [Consumption (Birr)]	0.1353**	0.1298**	0.1267**	0.1305**	0.1137**	0.0438
	(0.0549)	(0.0552)	(0.0541)	(0.0540)	(0.0547)	(0.0542)
Distance to Closest Market (KM)	-0.0043***	-0.0042***	-0.0041***	-0.0052***	-0.0044***	-0.0198***
	(0.0012)	(0.0013)	(0.0012)	(0.0013)	(0.0010)	(0.0070)
Household Size	0.0383**	0.0359**	0.0384**	0.0438***	0.0377**	0.0185
	(0.0161)	(0.0174)	(0.0161)	(0.0163)	(0.0153)	(0.0192)
Dependency Ratio	-0.1769***	-0.1714***	-0.1494***	-0.1731***	-0.1387***	-0.0218
	(0.0590)	(0.0588)	(0.0574)	(0.0583)	(0.0511)	(0.0585)
More than Half of the HH Production Sold †	-0.3439	-0.3497	-0.3014	-0.3100	-0.3680	-0.4194
	(0.2878)	(0.2928)	(0.3030)	(0.2890)	(0.2811)	(0.3145)
Non-agricultural Labor Income †	0.0412	0.0442	0.0112	0.0120	-0.0534	-0.1569
	(0.1069)	(0.1083)	(0.1074)	(0.1090)	(0.0992)	(0.1018)
Household Agro-Ecological Zone Classification						
Tropic-Warm/Semiarid †	2.2417***	2.2219***	2.3087***	2.1586***	1.9143***	0.8807
	(0.3868)	(0.3925)	(0.3559)	(0.4396)	(0.4397)	(0.7870)
Tropic-Cool/Semiarid †	1.0605***	1.0515***	1.1419***	1.1085***	0.7156*	0.5624
	(0.3072)	(0.3071)	(0.3086)	(0.3208)	(0.4034)	(0.8010)
Tropic-Cool/Subhumid †	1.1364***	1.1140***	1.1909***	1.2156***	0.9285**	0.0691
	(0.3076)	(0.3086)	(0.3295)	(0.3216)	(0.3998)	(0.3787)
Tropic-Cool/Humid †	0.3326	0.3189	0.4584	0.4183	0.3081	-0.3124
	(0.3276)	(0.3290)	(0.3412)	(0.3443)	(0.4098)	(0.4215)
Shocks						
Crop Damage †	-0.0256	-0.0309	-0.0273	-0.0091	-0.1133*	-0.0069
	(0.0681)	(0.0684)	(0.0702)	(0.0667)	(0.0655)	(0.0585)
Observations	1,277	1,273	1,277	1,264	1,277	1,277
R-Squared	0.344	0.346	0.357	0.355	0.484	0.667

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable

Table A.6: Exploring the Presence of Omitted Variable Bias in Base OLS Regression Results Underlying the Mean Decomposition, Female Sample

Dependent Variable: Log [Self-Reported Productivity (Birr/HA)]

		Category of Additional Covariates Integrated into the Base Regression				
	Base	*Other Manager Characteristics*	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Manager Characteristics						
Age (years)	0.0008	0.0152	0.0001	0.0021	0.0027	-0.0046
	(0.0055)	(0.0298)	(0.0055)	(0.0055)	(0.0061)	(0.0098)
Years of Schooling	0.0886*	0.1190*	0.0915**	0.1000**	0.1047**	0.0940
	(0.0451)	(0.0632)	(0.0462)	(0.0456)	(0.0446)	(0.1148)
Manager Disability †	-0.1010	-0.1183	-0.1089	-0.1291	0.1280	-0.0617
	(0.1449)	(0.1544)	(0.1516)	(0.1486)	(0.1798)	(0.2882)
Hours per Week for Agriculture Activities	-0.0030	-0.0031	-0.0030	-0.0033	-0.0022	0.0000
	(0.0035)	(0.0038)	(0.0036)	(0.0035)	(0.0045)	(0.0063)
Access to Extension Program †	-0.2868*	-0.2795	-0.2909	-0.2970*	-0.1089	-0.0550
	(0.1728)	(0.1835)	(0.1812)	(0.1756)	(0.2131)	(0.2722)
Access to Credit Services †	-0.0167	-0.0303	-0.0386	-0.0398	-0.0405	0.0269
	(0.1642)	(0.1706)	(0.1784)	(0.1441)	(0.1839)	(0.4301)
Manager Land Tenancy						
Log [HA]	-0.0249	-0.0259	-0.0359	-0.0146	-0.1833*	-0.5405**
	(0.0890)	(0.1054)	(0.0880)	(0.0820)	(0.1004)	(0.2083)
Number of Fields Managed	-0.0517***	-0.0495***	-0.0488***	-0.0552***	-0.0461***	0.0664
	(0.0138)	(0.0176)	(0.0131)	(0.0128)	(0.0144)	(0.0460)
Total Number of Crops Produced	0.0863***	0.0816***	0.0869***	0.0897***	0.0184	0.0238
	(0.0271)	(0.0311)	(0.0300)	(0.0276)	(0.0437)	(0.0648)
Fields for which HH has a Certificate	-0.2148	-0.2073	-0.1951	-0.2630*	-0.2534	0.1224
	(0.1403)	(0.1416)	(0.1401)	(0.1383)	(0.1913)	(0.4513)
Manager's Plot Occupation: Rented (% of parcels)	0.7741	0.7580	0.7446	0.8332	0.6369	-0.5057
	(0.5030)	(0.5041)	(0.5138)	(0.5107)	(0.7875)	(1.4674)
Manager's Plot Characteristics						
Intercropping (% of fields)	0.0490	0.0691	0.1387	0.1279	0.7650**	0.8233
	(0.2441)	(0.2563)	(0.2669)	(0.2437)	(0.3515)	(0.8917)
Slope	-0.0035	-0.0032	-0.0064	-0.0034	-0.0135	-0.0070
	(0.0108)	(0.0108)	(0.0105)	(0.0106)	(0.0108)	(0.0430)
Distance to Household	-0.0175**	-0.0181**	-0.0168**	-0.0164*	-0.0080	-0.0163
	(0.0078)	(0.0081)	(0.0075)	(0.0093)	(0.0153)	(0.0165)

Table A.6 (Continued)

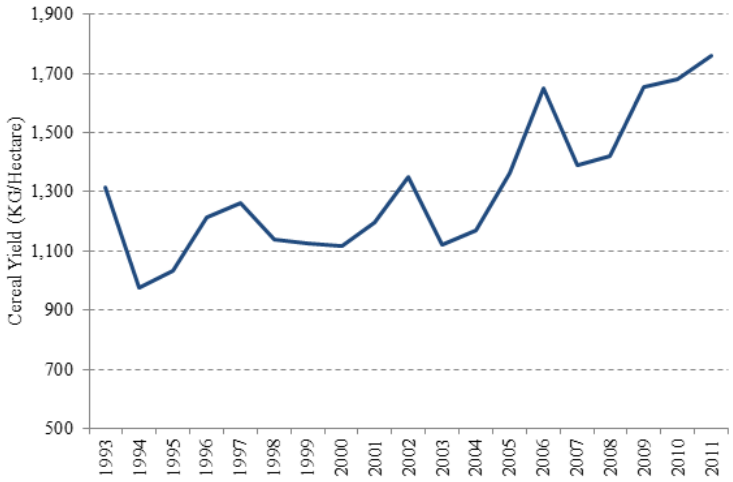
		Category of Additional Covariates Integrated into the Base Regression				
	Base	*Other Manager Characteristics*	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Manager's Agricultural Non-Labor Input Use (for Season)						
Fields that Use (% of Total)						
Irrigation	0.1814	0.1849	0.0178	0.2362	0.4728	0.1969
	(0.3085)	(0.3194)	(0.3692)	(0.3064)	(0.3599)	(0.7015)
Fertilizer	-1.2988***	-1.2935***	-1.2568***	-1.1400***	-1.7345***	-0.3086
	(0.4236)	(0.4583)	(0.4407)	(0.3820)	(0.4693)	(0.8412)
Organic Fertilizer	0.8066**	0.7774**	0.7653**	0.6827**	1.4140***	0.9505
	(0.3318)	(0.3594)	(0.3510)	(0.3308)	(0.4298)	(0.8679)
Pesticide, Herbicide or Fungicide	1.2564***	1.2775***	1.2294***	1.1937***	1.4513***	0.9044
	(0.4219)	(0.4031)	(0.4560)	(0.4296)	(0.4400)	(1.2022)
Improved Seeds	-0.0428	0.0096	0.0055	-0.1007	-0.3041	-0.0760
	(0.4811)	(0.5070)	(0.5078)	(0.4787)	(0.6618)	(0.6200)
Chemical Fertilizer Used per Hectare (KG/HA)	0.0057***	0.0057***	0.0056***	0.0054***	0.0054***	0.0030
	(0.0014)	(0.0015)	(0.0014)	(0.0014)	(0.0018)	(0.0020)
Oxen per Hectare	-0.1397***	-0.1353***	-0.1441***	-0.1351***	-0.1598	-0.1523***
	(0.0374)	(0.0398)	(0.0385)	(0.0385)	(0.0991)	(0.0432)
Agricultural Implement Access Index	0.0323	0.0370	0.0354	0.0307	0.0641	0.0087
	(0.0447)	(0.0464)	(0.0463)	(0.0447)	(0.0571)	(0.1294)
Manager's Agricultural Labor Input Use (for Season)						
Household Male Labor Use ('000 Hours/HA)	-0.0184	-0.0246	-0.0219	-0.0125	0.0134	-0.0735*
	(0.0322)	(0.0333)	(0.0309)	(0.0413)	(0.0253)	(0.0387)
Household Female Labor Use ('000 Hours/HA)	0.0673	0.0735	0.0631	0.0601	0.0510	0.0397
	(0.0449)	(0.0464)	(0.0463)	(0.0435)	(0.0449)	(0.0975)
Household Child Labor Use ('000 Hours/HA)	0.2718*	0.2681*	0.2874*	0.2676*	0.2315	0.0998
	(0.1439)	(0.1485)	(0.1467)	(0.1515)	(0.1449)	(0.1743)
Total Hired Labor Use ('000 Days/HA)	-0.4347	-0.6085	-0.3749	-0.2301	-0.3200	1.5138
	(0.6889)	(0.7441)	(0.7159)	(0.8022)	(0.9174)	(2.0545)
Total Exchange Labor Use ('000 Days/HA)	-0.1911	-0.2047	-0.2047	-0.2259	-0.1220	-1.5011
	(0.1487)	(0.1500)	(0.1500)	(0.1570)	(0.1245)	(3.2148)

Table A.6 (Continued)

		Category of Additional Covariates Integrated into the Base Regression				
	Base	*Other Manager Characteristics*	*Other Land Characteristics*	*Other Household Characteristics*	*Product Fixed Effects*	*Woreda Fixed Effects*
Household Characteristics						
Log [Consumption (Birr)]	0.0241	0.0259	0.0401	0.0607	-0.0525	0.1494
	(0.1046)	(0.1076)	(0.1126)	(0.1091)	(0.0986)	(0.2881)
Distance to Closest Market (KM)	-0.0050**	-0.0050**	-0.0045*	-0.0052**	-0.0063**	-0.0239
	(0.0023)	(0.0023)	(0.0024)	(0.0023)	(0.0028)	(0.0668)
Household Size	0.0044	0.0054	-0.0093	-0.0103	0.0307	-0.0085
	(0.0497)	(0.0506)	(0.0514)	(0.0520)	(0.0494)	(0.0803)
Dependency Ratio	-0.0616	-0.0572	-0.0319	-0.0305	-0.0148	0.0487
	(0.0909)	(0.0944)	(0.1122)	(0.0950)	(0.1223)	(0.1856)
More than Half of the HH Production Sold †	-0.3692	-0.3042	-0.3111	-0.3377	-0.7351**	-0.0820
	(0.4014)	(0.4133)	(0.4272)	(0.3976)	(0.2920)	(0.7518)
Non-agricultural Labor Income †	-0.0342	-0.0141	-0.0371	-0.0030	-0.0188	0.0403
	(0.1960)	(0.2003)	(0.1938)	(0.1831)	(0.2075)	(0.3977)
Household Agro-Ecological Zone Classification						
Tropic-Warm/Semiarid †	3.0512***	3.0994***	3.0956***	3.1347***	2.4635**	
	(0.5237)	(0.5501)	(0.5982)	(0.6910)	(0.9973)	
Tropic-Cool/Semiarid †	3.2374***	3.2358***	3.3635***	3.5025***	3.3487***	7.3516
	(0.4988)	(0.5097)	(0.5514)	(0.5959)	(0.5159)	(19.3629)
Tropic-Cool/Subhumid †	3.2379***	3.2437***	3.3290***	3.5332***	3.4546***	7.1476
	(0.4309)	(0.4389)	(0.5176)	(0.5293)	(0.4516)	(19.1709)
Tropic-Cool/Humid †	2.4622***	2.4782***	2.5950***	2.7624***	2.9669***	-3.5222
	(0.4387)	(0.4435)	(0.5374)	(0.5149)	(0.4723)	(2.2721)
Shocks						
Crop Damage †	-0.0043	-0.0177	-0.0203	-0.0148	0.0807	0.0413
	(0.1073)	(0.1106)	(0.1072)	(0.1144)	(0.1274)	(0.3048)
Observations	241	241	241	239	241	241
R-Squared	0.525	0.527	0.534	0.551	0.694	0.897

Note: Clustered Standard Errors at EA (Enumeration Area) Level in Parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† Denotes a Dummy Variable

Figure A.1: Ethiopia Annual Cereal Yield



Source: World Bank
http://data.worldbank.org/country/ethiopia