WOMEN FARMERS IN TIMOR-LESTE:

Bridging the Productivity Gap

UN WOMEN and World Bank Group's East Asia and Pacific Gender Innovation Lab

moving towards gender equality

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Summary

While the presence of gender gaps in agricultural productivity is common to many developing countries, understanding the country-specific mechanisms behind them is fundamental for designing policies that can improve the lives of women and men in the agriculture sector. In the present note we estimate the gap in agricultural productivity between female and male farmers in Timor-Leste and examine the factors associated with it. We find that women produce 15% less than men per hectare of land and that unequal farm labor and farming tools, lower literacy, limited involvement in cash crop production and farmers' groups among women are the most important factors that explain this gap. These findings suggest various avenues of future research and potential policy actions: tailoring agriculture interventions to consider literacy levels of female and male farmers; improving understanding of women and men's perceptions of extension services and farming groups, as well as access to tools and labor-saving technology; improving understanding of intra-household decision-making around crop selection and sales alongside analysis of market access, as well as a continued effort to invest in developing capacities in gender-sensitive agriculture data and analysis. This may improve female farmers' productivity and strengthen the agricultural sector in Timor-Leste as a whole.

Introduction

According to the 2015 Timor-Leste Population and Housing Census[1], agriculture is the predominant economic activity in the country, with more than 80% of households engaging in at least minor agricultural work[2], with 70% of farmers over the age of 40[3]. Analysis of the 2013 Labour Force Survey suggests that the agriculture, forestry and fishing sectors contributed to 19.3% of non-oil GDP and 40.5% of non-oil employment, with skilled agricultural work being the largest occupation group for both women and men, as of 2013[4]. Women play an important role as cultivators, laborers and family workers, with 66% of employed women self-employed as farmers, compared to 62% of men[5]. Farming is predominantly on subsistence level[6], with maize, roots and tubers[7], rice, and beans taking up the largest share of households' production. The majority of households also produce some fruit and vegetables. Coffee is the only major cash crop and its production is concentrated in the central uplands.

Despite its leading role in the livelihoods of Timorese households, agriculture in Timor-Leste has not fulfilled its potential, with cereal yields being among the lowest in the East Asia and the Pacific (EAP) region[8]. Access to agricultural technology is limited with only about 10% of households using mulching, fertilizers, pesticides and less than 15% having access to improved seeds. Access to irrigation and formal land tenure is also limited, with less than a fifth of households holding a formal title for their land, noting that recently passed land legislation is in the early stages of implementation.

Gender disparities is another visible barrier in Timor-Leste, such as women and men's literacy and educational outcomes, and reflect international evidence[9] highlighting that constraints female farmers face may be different from

1 Unless indicated otherwise, all country-specific statistics come from the 2015 Timor-Leste Population and Housing Survey.
2 In rural areas, this fraction is as high as 95%.
3 2015 Timor-Leste Population and Housing Census and 2018 Census Analytical Report on Agriculture (based on 2015 Census).
4 UN Women, ILO, Secretary of State for Employment Policy and Secretary of State for Support and Socio-Economic Promotion of Women. 2017. Gender Analysis of the 2013 Timor-Leste Labour Force Survey
5 2018 Census Analytical Report on Agriculture
6 Less than 3% of agricultural households produce mainly for sale and only about half sell any of their production.
7 Cassava, sweet potato, etc.
8 Cereal yield per hectare, World Bank Databank, 2014
9 *O'Sullivan, Michael; Rao, Arathi; Banerjee, Raka; Gulati, Kajal; Vinez, Margaux. 2014. Levelling the field : improving opportunities for women farmers in Africa (English). World Bank, Washington, DC. © World Bank*

those faced by male farmers, which affects outcomes for individual farmers as well as their households. As such, gender gaps in agricultural productivity are important to understand to realize the potential of the agricultural sector in Timor-Leste. Lower agricultural productivity among female farmers is a feature of agriculture in many countries, leading to significant economic losses and jeopardizing growth. For example, in Malawi, where women produce 28% less per hector compared to men, the annual cost of this gender gap was estimated at USD 100$ million. In Tanzania and Uganda, where the gender gaps are 16% and 13%, the cost of gender gap in agricultural productivity was estimated at USD 105 and USD 67 million, respectively[10].

Women play an important role in Timor-Leste's agriculture as cultivators, laborers and family workers. In agricultural households with both women and men, farm work is often done together with distinct roles in agricultural production. However, are female and male farmers equally productive? If not, do women face additional constraints in terms of access to agricultural factors of production? Do they gain lower returns on specific factor of production, due to lack of knowledge or potentially, discrimination? This note pursues two objectives. First, it aims to provide the first nation-wide analysis of the productivity gap between female and male farmers in Timor-Leste. Second, it analyzes the drivers behind observed gender gap, and sheds light on whether the gender gap is predominantly explained by differences in access to factors of production, or differences in returns to these factors. Based on these findings, the note also provides ideas on future research and potential policy actions, relevant to the Timorese setting.

The note is organized as follows: we provide a brief description of the data and methodology used for this analysis, followed by description of the key findings. A set of research and potential policy actions concludes.

Data and Methodology

THE TIMOR-LESTE SURVEY OF LIVING STANDARDS

This analysis draws from the 2014 wave of the Timor-Leste Survey of Living Standards (TLSLS), which includes nationally representative data on 6,000 households, about 4,880 of which are involved in agriculture. The TLSLS dataset contains information on land, crops, prices, labor and non-labor inputs, as well as individual- and household-level characteristics. However, for some households, this information is missing. If we exclude the observations with missing values, the sample is reduced to 4,266 agricultural households (including households with both men and women in the household, men only or women only). The analysis takes into account the survey's stratified two-stage sampling design and applies appropriate weights and clustering of standard errors to all estimates.

WHO ARE WOMEN FARMERS?

The dataset allows us to compare female and male farmers (interchangeably referred to as farm managers). Production is reported at the household but not at the plot level. Consequently, we can only calculate individual, gender specific productivity for households with only one manager11, responsible for all the plots of land. We limit our analysis to this type of households, which account for 83.5% (3,561) of the TLSLS 2014 sample.

Table 1 shows that in 16% of these households, the manager is female, while in 84% the manager is male. Of all households with one female manager, 21% are still reportedly headed by a man. A more detailed look at the data

10 "The cost of the gender gap in agricultural productivity in Malawi, Tanzania and Uganda", World Bank, UN Women, and United Nations Development Programme–United Nations Environment Programme Poverty-Environment Initiative, available at: www.worldbank.org/en/programs/africa-gender-innovation-lab

11 The survey question identifies manager by asking: "Who in this household makes the decisions about this plot of land?" Question 9.03

reveals that these are households where an adult male is present, that is where the female manager is currently married and her spouse is not away from the household.

Table 1: Female farmers and household composition

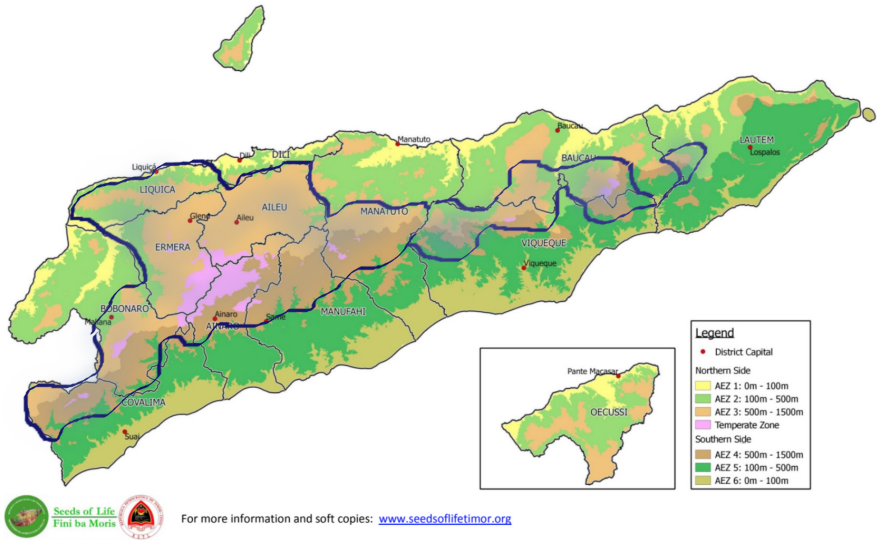
	Only one female manager (16%)	Only one male manager (84%)
Manager is not household head	22%	3%
Manager is household head	78%	97%
Household head is male	21%	99%
Household head is female	79%	1%

To make sure that the results are not driven by the household composition or the marital status of our subsample of households with only one female manager, we conduct two robustness checks. Specifically, we redo analysis with the sample of only married farm managers and with the sample which also includes households with more than one manager. The results reported in this note are robust to these changes in the sample.[12]

CENTRAL AND COASTAL REGIONS

Timor-Leste's agricultural landscape is characterized by seven agro-ecological zones (Figure 1), two of which (mild and high-elevation uplands) stand out with steep slopes, high rainfall, sandy and clay soils, and a higher focus on coffee production.[13] We refer to these two agro-ecological zones as the Central region in this analysis, while the remaining part of the country is referred to as the Coastal region. The striking difference in agricultural conditions in the two regions, as well as higher value of the coffee compared to subsistence crops may lead to differences in productivity (including by gender). Consequently, we conduct analysis on both national and regional level.

Figure 1 Agro ecological zones of Timor-Leste



12 The results from these robustness checks are available upon request.
13 Seeds of Life, 2015.

OAXACA-BLINDER DECOMPOSITION

To analyze the drivers behind gender differences in agricultural productivity, we rely on the Oaxaca-Blinder decomposition method. This method allows for a breakdown of the gender gap into two main components: the endowment effect and the structural effect. The endowment effect refers to the portion of the gender gap that is a result of differences between men and women in terms of factors of production (human capital, including age and education, and physical capital, such as farm inputs). *This portion of the gender gap provides direct implications for policy and programming efforts, as it is attributable to the quantity of resources that women can access relative to men.*

The structural effect captures the *returns to the factors of production.* This portion of the gender gap results from differences in what amount of output is obtained from a given amount of a factor of production. In this study, this would be the difference in agricultural output per hectare obtained by men and women with the same observable characteristics, such as, for example, years of education, hired labor and participation in farmers' groups.

An important limitation of this approach is that while it is very useful in quantifying the correlations between contributing factors and an outcome, these identified relationships are by no means causal. Therefore, wherever we use the term "determinant" or "driver" we mean factors that have an important correlation with the outcome of interest, however, the causal relationship between the outcome and the factor cannot be established.

A related limitation stems from inability of a researcher to obtain information on all relevant inputs, resources or characteristics contributing an outcome, which in our case is agricultural productivity. Although TLSLS 2014 is a very rich dataset, it indisputably misses some of the important inputs into the agricultural production process. This means that the explanatory effect of any such omitted factor would be automatically attributed to the structural component, thus affecting the results of the decomposition. That is why it is important to make use of as many as possible potential contributing variables in the analysis. A full list of the variables included in our analysis is presented in the Appendix.

HOW WE MEASURE PRODUCTIVITY

In this study we define agricultural productivity as the average value (in USD) of agricultural output produced per hectare (ha) of land. This has been the standard in the studies of gender gaps in agricultural productivity (for instance, O'Sullivan et al., 2014). The analysis aggregates production at the household level and computes the share of the value of output attributable to each crop produced by the household. For instance, a household with a male manager that produced 2,500 USD worth of production per ha, half of which was rice and the other half-maize, is considered more productive than a household with a female manager that produced 2,000 USD worth of the same composition of crops per ha. The quantity of agricultural output and land size is measured by farmers' estimates, reported during the TLSLS 2014 survey. Value of agricultural output is computed using the median reported price for the corresponding crop at the sub-district level or at a higher enumeration area level when necessary.[14] We also use price information from FAO and local authorities for comparability.[15]

14 Sometimes there were not enough observations per crop on the sub-district level, which meant the median of the district (and in few cases - national) level had to be taken.

15 We use FAO price statistics, available at: http://www.fao.org/faostat/en/#data/PP as well as national average prices for a number of crops provided by the Agricultural Ministry. We used these datasets as a reference when dealing with outliers in the reported prices. For instance, there was a lot of variation in reported prices for upland (or "gogo") rice with values ranging from as low as 0.02 dollars and as high as 100 dollars per kilogram and a median of 20 dollars per kilogram. We adjusted this price distribution using an average of the national price provided by the Agricultural Ministry and FAO reference prices per kilogram. Notably, the percentage size of the gap from our main specification does not change substantially if we leave the prices as reported in the survey. This was mainly done to obtain realistic estimates of the total value of household production.

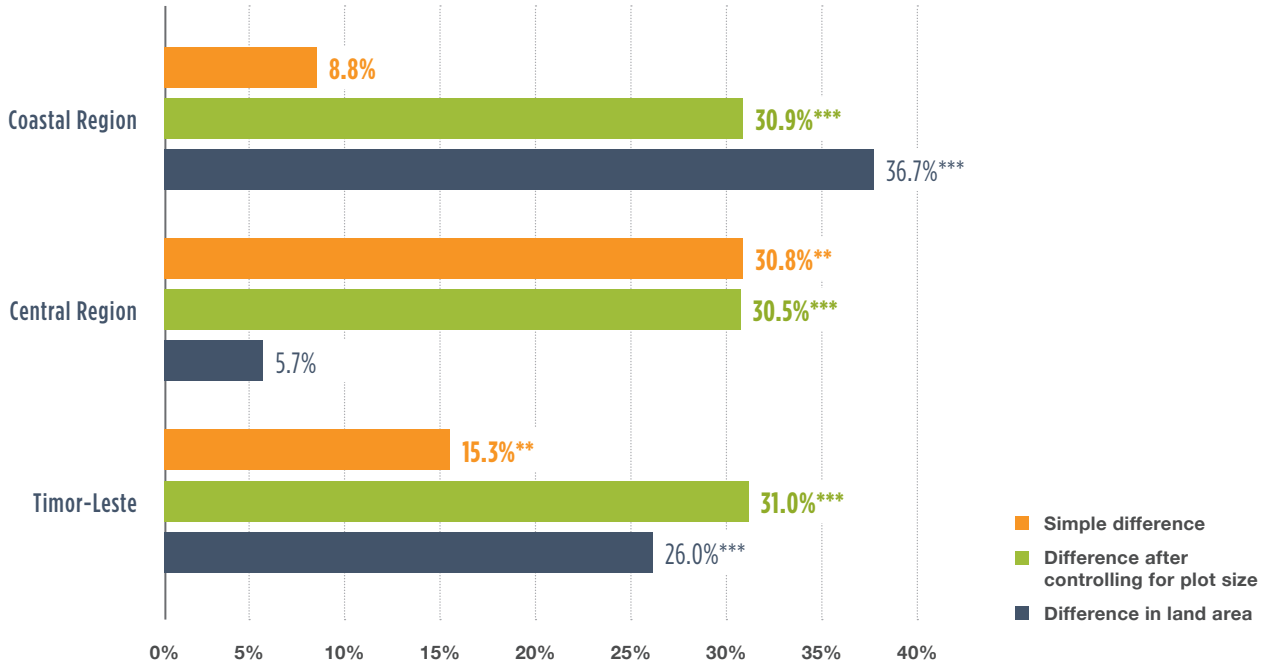
SUMMARY OF FINDINGS

WOMEN FARMERS PRODUCE ABOUT 31% LESS PER HECTARE THAN THEIR MALE COUNTERPARTS

A simple comparison of average male and female productivity at the national level shows that women are 15% less productive than men in Timor-Leste. More disaggregate analysis suggests differences in average productivity between the two regions of focus, described above. In the Coastal Region the gender gap in productivity is small in magnitude (8%) and statistically insignificant. It is much larger and statistically significant in the Central Region, where the country's only cash crop, coffee, is predominantly cultivated. In the Central Region male farmers produce on average 31% more per hectare than their female counterparts.

A more refined measure of the gender gap takes into account differences in land size and geographic factors. Applying this measure reveals a striking picture: when we calculate the gender gap, comparing men and women with similar-sized plots and in similar sub-districts, it increases to 31% in the Coastal Region, becoming virtually indistinguishable from the one in the Central Region[16] Figure 2 presents these results. Since controlling for land size reveals a homogeneous productivity gap across the country, in the following sections we report the decomposition results on the national level only.[17]

Figure 2 Gender gap in agricultural productivity and land area by region



Note: The symbols */**/*** denote statistical significance at the 10%, 5% and 1% levels respectively.

16 The average land area operated by men in the coastal region is 0.81 ha, while the average land area operated by men in the central region is 0.61 ha. As Figure 2 shows, as well as having larger average land area, the coastal region has a much more unequal gender distribution of land.

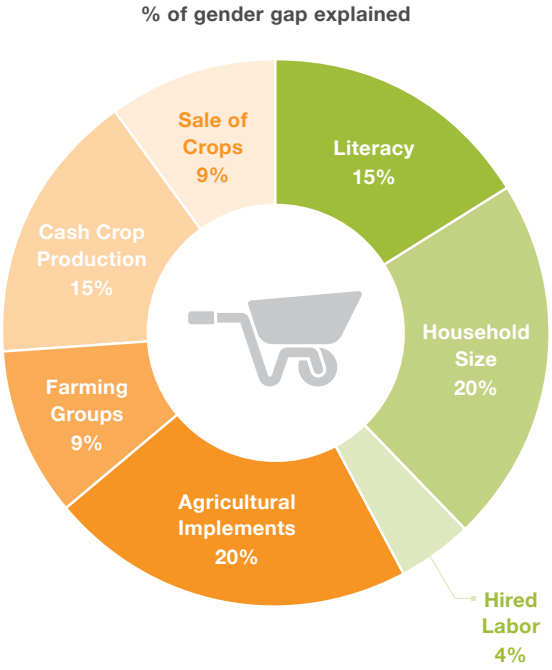
17 We still perform the decomposition analysis separately for the Central and Coastal regions and find that the results are similar.

THE GENDER GAP IS EXPLAINED BY DIFFERENCES IN INPUTS

What explains this observed gap? As mentioned earlier, Oaxaca-Blinder decomposition attributes part of the gender gap in agricultural productivity to differences in factors of production men and women have access to, and another part to differences in returns to these factors. Our analysis reveals that about 88% of the productivity differences between men and women farmers in Timor-Leste is explained by observed differences in the factors of production. Only 11% is attributable to the difference in returns to these factors, but this result is not statistically significant[18]. This analysis has been carried out at the national level, but the results are similar if Oaxaca-Blinder decompositions are applied separately to central and coastal regions.

Of course, given the data limitations, we have not been able to take into account every possible input into agricultural production. However, our data allow for inclusion of a rich set of variables. Table A2 in the Appendix presents detailed results of decomposition, which includes 84 variables. Notably, we take into consideration types of crops produced, and shares of different crops. However, only few of these variables play a strong role in explaining the observed gender gap – or, in technical terms, make a statistically significant contribution to it. These variables are: literacy, household size, using hired labor on the plot, level of use of agricultural implements, such as hoes, axes, shovels, baskets, carts, and threshers (we combine all these implements in a single index), participation in farming groups, growing coffee and selling crops in the market. We list these variables in Figure 3 and specify percentage of the gap that they explain[19].

Figure 3: Main factors explaining the gender gap in agricultural productivity [20].



The results from Oaxaca-Blinder decompositions suggest that bridging the gap in characteristics and inputs used by male and female farm managers could almost completely close the gender gap in agricultural productivity in Timor-Leste. Indeed, the gap is explained nearly in its entirety by differences in access to several factors of production.

18 For detailed results of the decomposition, please see Appendix, Table A2.
19 The technical appendix at the end of the document contains a description of how these are calculated.
20 The fraction of gender gap attributable to differences in returns to these factors is not shown.

However, these differences are large. Table 3 below presents the differences between men and women in access to resources that play key role in explaining gender gap in agricultural productivity, based on the 2014 data:

Table 3. Differences in access to resources, explaining the gap

	women	men
Literacy rate among farmers[21]	20%	41%
Household size	3.9	5.6
Hired labor (male)	0.64 days per ha	1.06 days per ha
Agricultural implements index[22]	-0.19	0.21
Participated in a farming group	2%	7%
Produced processed coffee beans (cash crop)[23]	16%	22%
Sold any crops	52%	56%

AVENUES OF FUTURE RESEARCH AND POTENTIAL POLICY ACTIONS

Our analysis suggests that gender gap in agricultural productivity in Timor-Leste is high. At the national level, simple difference in average productivity between male and female managed plots amount to approximately 15%. When we take into account differences in geographic regions and land size, the gap increases to 31%. Clearly, reducing gender gap in agricultural productivity offers significant gains for overall agricultural productivity in Timor-Leste.

This initial analysis also demonstrates that nearly entire gender gap in agricultural productivity is explained by differences in factors of production that male and female farmers have access to. Based on the analyzed data, of particular importance are access to hired labor, agricultural implements, such as shovels, hoes and axes, farming networks as well as the ability to produce cash crops rather than subsistence crops. It is important to note that even though men's access to the above factors is low in Timor-Leste, women have even lower access. Based on these results, the following areas of research and potential policy actions might be promising:

1. Taking into consideration the disparity in literacy between female and male farmers in the process of developing agriculture materials, extension services or trainings for farming communities may make such trainings more accessible to both groups.

2. Women and men's perceptions of extension services and farming groups need to be better understood to identify where further investments are needed, noting the low fraction of women among extension workers (only 11%) and women's unequal childcare or household responsibilities.

21 Literacy rate among farmers is much lower than the national average of 63.1 percent for men aged 15 years and above and 52.5 percent for women (as per 2015 Census).

22 The agricultural implements index reflects ownership of tools such as hoes, shovels and axes. It is constructed using principal components analysis and standardized to mean zero and standard deviation of one. Therefore, negative values stand for ownership of such assets below average, and vice versa.

23 The analysis explores the contributions of other crops to the gender gap in agricultural productivity but concludes that only differences in production of processed coffee beans is a statistically significant factor in explaining the gender gap.

3. Greater understanding of intra-household decision-making around crop selection and sales is needed alongside analysis of access to markets to understand barriers and choices faced by individual women and men farmers and how it affects their decisions as a household.

4. While providing relevant information, this analysis highlights the limitations of currently available data on gender dimensions to the agriculture sector. Consequently, investing in developing capacities on gender sensitivity in agriculture data collection and analysis, beyond sex and age-disaggregated data, is critical to strengthen the effectiveness of the sector's policy and programming investments.

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APPENDIX

TECHNICAL NOTE ON OAXACA-BLINDER

The Oaxaca-Blinder method is a counterfactual decomposition of mean differences between groups into an observed (endowment) component and unobserved (structural) component. It is often applied to analysis of wage gaps by sex and race. It is counterfactual because it applies a partial equilibrium approach that uses observed outcomes for one group to construct counterfactual ones for the other one.

The decomposition method used relies on the following regression equation of the log of agricultural productivity per hectare (Y) for households with a male (M) and a female (F) manager:

$$Y_{G0} = \beta_{G0} + \sum_{k=1}^{K} X_{Gk}\,'\beta_{Gk} + \epsilon_G, (1)$$

where G stands for the gender of the manager (M or F), X is a vector of control variables on manager and household level (including land and farm labor and non-labor inputs), β_0 and β_k are the associated intercept and slope coefficients, and ϵ are the random error components, such that $E(\epsilon_M) = E(\epsilon_F) = 0$.[24]

24 We denote the mean (expected value) of a variable *A* as *E(A).*

The gender productivity gap, D, can be expressed as the difference in outcomes:

$$D=E(Y_M) - E(Y_F).(2)$$

From (1) and (2) we can derive:

$$D = E\left(\beta_{M0} + \sum_{k=1}^{K} X_{Mk}\,\beta_{Mk} + \epsilon_M\right) - E\left(\beta_{F0} + \sum_{k=1}^{K} X_{Fk}\,\beta_{Fk} + \epsilon_F\right) (3)$$

which results in:

$$D = \beta_{M0} + \sum_{k=1}^{K} E(X_{Mk})\,\beta_{Mk} - \beta_{F0} - \sum_{k=1}^{K} E(X_{Fk})\,\beta_{Fk} (4)$$

Now let's consider the pooled model, where we estimate the regression in (1) on the pooled sample of male and female managers. We denote the intercept and slope coefficients from that regression by β^*_0 and β^*_k. Note that the pooled model also includes a dummy for manager's gender[25].

We can now transform (4) by adding and subtracting β_0^*, $\sum_{k=1}^{K} E(X_{Mk})\,\beta_k^*$, and $\sum_{k=1}^{K} E(X_{Fk})\,\beta_k^*$ [26] :

$$\underbrace{\beta_{0M} - \beta_0^* + \sum_{k}^{K} E(X_{Mk})(\beta_{Mk} - \beta_k^*)}_{\text{2.1 male structural advantage}} + \underbrace{\beta_0^* - \beta_{0F} + \sum_{k}^{K} E(X_{Fk})(\beta_k^* - \beta_{Fk})}_{\text{2.2 female structural disadvantage}} (5)$$

$$\text{2. Structural effect}$$

The first component represents the endowment effect, which corresponds to the difference in observable covariates between the two groups multiplied by the coefficient of the corresponding covariate in the pooled model. This is how we compute the coefficients in Table A2. We use these coefficients to calculate the percentage share that the gap in each input contributes to the productivity gap (Figure 3).

The second component represents the structural effect: the gap that emerges from differences in observed returns to covariates. The structural component can be further divided into male structural advantage and female structural disadvantage. The male structural advantage is the portion of the gap explained by the difference of the male returns to covariates (the β_M coefficients) from the pooled returns (the β^* coefficients). The female structural disadvantage is conversely the deviation of the pooled returns to covariates from the female ones.

In conclusion, to perform the decomposition in practice we estimate equation (1) for the male, female and pooled sample to obtain the coefficients needed to obtain the components in (5).

25 We include the dummy because we acknowledge that the gender of the manager is an important factor in explaining productivity. If we omit the gender dummy we can distort the decomposition due to a residual group difference reflected in β^*_k.

26 $\sum_{k=1}^{K} E(X_{Mk})\,\beta_k^*$ and $\sum_{k=1}^{K} E(X_{Fk})\,\beta_k^*$

Table A1: OLS regressions underlying the decomposition

Dependent variable: Log(Value of harvest in USD/ha)

	(1) Pooled	(2) Female	(3) Male
Female	-0.0200		
	(-0.35)		
Age	0.00216*	-0.00192	0.00197
	(1.68)	(-0.51)	(1.41)
Married	0.0295	-0.0478	0.0514
	(0.35)	(-0.29)	(0.50)
Widowed	0.0447	0.0143	0.0773
	(0.51)	(0.11)	(0.60)
Spouse away	0.0170	0.257	-0.00169
	(0.17)	(0.72)	(-0.02)
Literate	0.0966**	0.0699	0.0802*
	(2.28)	(0.56)	(1.86)
Worked for wage	-0.0150	0.0700	-0.0180
	(-0.30)	(0.33)	(-0.36)
HH Wealth Index	-0.000768	-0.0185	0.0114
	(-0.02)	(-0.30)	(0.32)
HH Size	0.0180**	-0.0313*	0.0217***
	(2.39)	(-1.71)	(2.83)
Log(land area in ha)	-0.742***	-0.651***	-0.746***
	(-23.12)	(-7.89)	(-22.37)
Log(land area in ha)^2	0.0491***	0.102***	0.0432***
	(4.86)	(3.97)	(4.29)
Child dependency ratio	0.0145	-0.0198	0.0264
	(0.45)	(-0.31)	(0.74)
Number of Livestock	0.0246*	0.0389	0.0217
	(1.66)	(1.14)	(1.38)
Fishing	-0.0658	0.0522	-0.0837
	(-0.67)	(0.16)	(-0.81)
Wet season	0.00307	0.0440	-0.0106
	(0.07)	(0.54)	(-0.24)
Tetum	0.0250	0.0636	0.0198
	(0.30)	(0.30)	(0.22)
Mambae	-0.0629	0.0882	-0.0818
	(-0.76)	(0.40)	(-0.94)
Rural	0.138**	0.210*	0.120**

	(1) Pooled	(2) Female	(3) Male
	(2.31)	(1.75)	(2.03)
Non-Catholic	0.0530	0.929***	-0.0103
	(0.36)	(3.02)	(-0.07)
Received remittances	-0.132***	-0.316***	-0.125***
	(-3.09)	(-3.62)	(-2.71)
Value of remittances	-0.0000158	0.000184*	-0.0000286
	(-0.66)	(1.79)	(-1.53)
Received loan	-0.107	-0.235	-0.114
	(-1.29)	(-1.09)	(-1.25)
Land avg. distance from home	0.00964***	0.00470	0.0102***
	(3.18)	(1.10)	(2.97)
Share of flat land	-0.0171	-0.191*	0.0350
	(-0.35)	(-1.78)	(0.72)
Share of house land	-0.151	-0.410**	-0.0972
	(-1.13)	(-1.97)	(-0.62)
Membership in farming group	0.255***	0.508*	0.250***
	(3.72)	(1.66)	(3.63)
Share of plots that can be sold	0.0271	0.0415	0.0575
	(0.32)	(0.23)	(0.67)
Share of owned plots	0.212***	0.372***	0.188***
	(3.57)	(2.73)	(3.16)
Share of land irrigated by tube well	0.0770	-0.0631	0.0843
	(0.67)	(-0.25)	(0.66)
Share of land irrigated by river	-0.0907	-0.279	-0.0919
	(-0.56)	(-0.48)	(-0.56)
Produced upland (gogo) rice	-0.0474	0.0283	-0.0260
	(-0.34)	(0.08)	(-0.19)
Produced rice	0.0424	0.300	0.0651
	(0.31)	(0.70)	(0.46)
Produced maize	0.0817	0.409	0.0831
	(1.12)	(1.47)	(1.10)
Produced maize (dry)	0.472***	0.274	0.560***
	(4.81)	(0.99)	(5.34)
Produced cassava	0.161**	0.724**	0.141*
	(2.31)	(2.56)	(1.91)
Produced coffee (raw)	0.0756	-0.109	0.118
	(0.62)	(-0.29)	(0.95)

	(1) Pooled	(2) Female	(3) Male
Produced coffee (dry)	0.478***	0.898**	0.470***
	(4.01)	(2.43)	(3.93)
Produced kidney beans	0.0226	0.701*	-0.00700
	(0.23)	(1.88)	(-0.07)
Produced sweet potato	0.108	0.514*	0.131*
	(1.49)	(1.91)	(1.77)
Produced potato	0.412***	1.144***	0.382***
	(4.45)	(3.74)	(4.24)
Produced taro	0.173**	0.356	0.213***
	(2.32)	(1.23)	(2.72)
Produced squash	0.221***	0.424	0.246***
	(3.33)	(1.40)	(3.78)
Produced mung beans	0.441***	0.700**	0.442***
	(4.35)	(2.16)	(4.11)
Produced soybeans	0.163*	0.239	0.207**
	(1.65)	(0.80)	(2.00)
Produced coconuts	0.132*	0.371	0.178**
	(1.73)	(1.30)	(2.23)
Produced peanuts	0.220***	0.856***	0.198**
	(2.60)	(2.86)	(2.28)
Produced vegetables	-0.129*	0.224	-0.137*
	(-1.68)	(0.86)	(-1.72)
Produced bananas	0.0164	0.265	0.0293
	(0.25)	(0.91)	(0.43)
Produced other fruit	-0.00802	0.174	0.0402
	(-0.07)	(0.46)	(0.33)
Produced other grains	0.468	-0.402	0.668**
	(1.57)	(-0.36)	(2.01)
Share of upland (gogo) rice	3.149*	-15.39	3.536**
	(1.84)	(-0.84)	(1.99)
Share of rice	3.657**	-15.29	4.057**
	(2.14)	(-0.84)	(2.27)
Share of maize	2.146	-15.75	2.424
	(1.24)	(-0.86)	(1.34)
Share of maize (dry)	1.527	-17.17	1.845
	(0.89)	(-0.94)	(1.04)
Share of cassava	1.639	-17.50	2.096
	(0.96)	(-0.96)	(1.18)

	(1) Pooled	(2) Female	(3) Male
Share of coffee (raw)	3.005*	-15.90	3.406*
	(1.75)	(-0.88)	(1.91)
Share of coffee(dry)	2.518	-16.36	2.948*
	(1.47)	(-0.90)	(1.65)
Share of kidney beans	2.114	-19.73	2.493
	(1.27)	(-1.08)	(1.46)
Share of sweet potato	1.476	-17.89	2.011
	(0.85)	(-0.98)	(1.11)
Share of potato	1.182	-18.94	1.699
	(0.68)	(-1.03)	(0.94)
Share of taro	1.329	-16.94	1.625
	(0.76)	(-0.93)	(0.89)
Share of squash	1.826	-16.53	2.231
	(1.06)	(-0.90)	(1.24)
Share of mung beans	0.974	-16.77	1.497
	(0.54)	(-0.91)	(0.79)
Share of soybeans	2.641	-14.12	2.659
	(1.46)	(-0.77)	(1.41)
Share of coconuts	2.696	-16.12	3.039*
	(1.58)	(-0.88)	(1.72)
Share of peanuts	2.227	-17.30	2.705
	(1.29)	(-0.94)	(1.50)
Share of vegetables	1.778	-17.45	2.325
	(1.03)	(-0.96)	(1.30)
Share of bananas	2.981*	-15.72	3.277*
	(1.73)	(-0.86)	(1.83)
Share of bananas	2.791	-15.28	2.836
	(1.59)	(-0.84)	(1.55)
HH sold any crop	0.320***	0.293***	0.311***
	(7.39)	(3.63)	(6.57)
Number of crops produced	-0.0746	-0.383	-0.0895*
	(-1.62)	(-1.51)	(-1.89)
Implements Index	0.0768***	0.110*	0.0673***
	(3.11)	(1.78)	(2.72)
Cultivates by hand	-0.0479	0.432*	-0.101
	(-0.50)	(1.80)	(-1.06)
Cultivates with own animals	-0.116	0.614	-0.220
	(-0.77)	(1.56)	(-1.40)

	(1) Pooled	(2) Female	(3) Male
Cultivates with rented animals	-0.0955	0.817**	-0.236
	(-0.52)	(2.28)	(-1.10)
Cultivates with tractor	0.0770	0.677**	-0.0203
	(0.73)	(2.48)	(-0.19)
Used pesticide	-0.0162	0.137	0.00731
	(-0.15)	(0.47)	(0.06)
Used fertilizer	-0.243	1.421*	-0.270
	(-1.05)	(1.95)	(-1.11)
Used herbicide	-0.226**	-0.331	-0.281**
	(-2.18)	(-1.12)	(-2.59)
Used manure	-0.0453	-1.100	0.0234
	(-0.28)	(-1.59)	(0.15)
Used seeds	0.351***	0.280***	0.362***
	(6.56)	(3.28)	(6.33)
Log (hours HH female labor/ha)	-0.0187	-0.0995***	-0.00506
	(-1.05)	(-2.80)	(-0.26)
Log (hours HH male labor/ha)	0.00133	0.00799	0.00313
	(0.10)	(0.21)	(0.22)
Log(days hired male labor/ha)	0.0808**	0.00761	0.0966***
	(2.34)	(0.08)	(2.66)
Log(days hired female labor/ha)	0.0159	0.150	-0.0151
	(0.42)	(1.51)	(-0.36)
Log(days hired child labor/ha)	0.106*	0.145	0.109*
	(1.69)	(1.04)	(1.73)
Constant	3.455**	22.26	3.083*
	(2.02)	(1.22)	(1.73)
N	**3,561**	**549**	**3012**

t statistics are in parentheses. Standard errors are clustered on enumeration area; all regressions include sub-district fixed effects.

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

Table A2: Oaxaca-Blinder: Detailed Results

	Overall gap	Endowments	Male structural advantage	Female structural disadvantage
Log (value of harvest in USD/ha)	0.152	0.134	0.000	0.018
	(2.11)**	(1.76)*	(0.00)	(0.32)
	Percent explained:	88.2%	0%	11.8%

	Overall gap	Endowments	Male structural advantage	Female structural disadvantage
Manager				
Age		-0.010	-0.009	0.222
		(1.58)	(0.35)	(1.18)
Married		0.020	0.020	0.016
		(0.35)	(0.35)	(0.47)
Widowed		-0.026	0.002	0.008
		(0.48)	(0.38)	(0.10)
Spouse away from HH		0.000	-0.001	-0.003
		(0.15)	(0.51)	(0.38)
Literate		0.023	-0.007	0.002
		(2.20)**	(1.15)	(0.09)
Works for wage		-0.002	-0.001	-0.003
		(0.35)	(0.27)	(0.38)
Household				
Wealth Index		0.000	-0.004	-0.003
		(0.02)	(1.12)	(0.14)
HH size		0.030	0.020	0.184
		(2.35)**	(1.04)	(2.65)***
Log (plot area in ha)		-0.196	0.004	0.098
		(3.75)***	(0.32)	(1.03)
Log (plot area in ha)^2		-0.015	-0.014	-0.141
		(1.36)	(1.45)	(2.07)**
Child dependency ratio		0.002	0.005	0.011
		(0.45)	(0.76)	(0.55)
Number of livestock		0.011	-0.008	-0.028
		(1.63)	(0.55)	(0.36)
HH engages in fishing		-0.001	-0.000	-0.002
		(0.62)	(0.40)	(0.33)
HH interviewed in wet season		-0.000	-0.005	-0.026
		(0.10)	(0.88)	(0.78)
HH language is Tetum		0.001	-0.000	-0.001
		(0.30)	(0.22)	(0.07)
HH language is Mambae		-0.002	-0.005	-0.026
		(0.68)	(0.65)	(0.50)
Rural		0.001	-0.015	-0.061
		(0.40)	(0.95)	(0.67)
HH is not Catholic		0.000	-0.002	-0.019

	Overall gap	Endowments	Male structural advantage	Female structural disadvantage
		(0.22)	(1.24)	(2.08)**
Received remittances		0.015	0.001	0.055
		(2.45)**	(0.39)	(2.24)**
Value of remittances (USD)		0.001	-0.001	-0.024
		(0.69)	(1.26)	(1.93)*
Received loan		-0.001	-0.000	0.005
		(0.83)	(0.12)	(0.61)
HH sold any crops		0.014	-0.005	0.013
		(1.65)*	(0.51)	(0.35)
Number of crops produced		-0.027	-0.048	1.739
		(0.95)	(0.66)	(1.24)
HH member in farming group		0.014	-0.000	-0.004
		(3.09)***	(0.26)	(0.78)
Land Characteristics				
Average distance from home		0.003	0.001	0.009
		(0.97)	(0.45)	(1.18)
Share of land which is flat		0.000	0.020	0.073
		(0.31)	(2.62)***	(1.79)*
Share of house (garden) land		0.004	0.001	0.014
		(1.06)	(0.60)	(1.38)
Share of land that can be sold		0.000	0.002	-0.001
		(0.09)	(1.09)	(0.09)
Share of owned land		0.002	-0.023	-0.139
		(0.49)	(1.23)	(1.33)
Share irrigated by tube well		0.004	0.001	0.007
		(0.67)	(0.26)	(0.46)
Share irrigated by river		-0.001	-0.000	0.002
		(0.56)	(0.05)	(0.28)
Crops (Dummies)				
Produced upland (gogo) rice		-0.001	0.001	-0.004
		(0.48)	(0.36)	(0.17)
Produced rice		0.003	0.004	-0.013
		(0.18)	(0.54)	(0.37)
Produced maize (fresh)		-0.001	-0.002	-0.173
		(0.46)	(0.18)	(1.21)
Produced maize (dry)		-0.006	0.071	0.192
		(0.69)	(2.24)**	(0.77)

	Overall gap	Endowments	Male structural advantage	Female structural disadvantage
Produced cassava		0.005	-0.019	-0.432
		(1.04)	(0.94)	(2.14)**
Produced coffee (raw)		0.002	0.007	0.031
		(0.47)	(0.80)	(0.58)
Produced coffee (dry)		0.023	-0.005	-0.076
		(1.90)*	(0.46)	(1.23)
Produced kidney beans		0.000	-0.006	-0.093
		(0.02)	(0.95)	(1.89)*
Produced sweet potato		0.004	0.007	-0.149
		(0.87)	(0.90)	(1.47)
Produced potato		0.007	-0.010	-0.178
		(0.59)	(1.26)	(2.41)**
Produced taro		0.005	0.014	-0.078
		(0.99)	(1.41)	(0.65)
Produced squash		0.001	0.007	-0.088
		(0.14)	(0.68)	(0.69)
Produced mung bean		0.002	0.000	-0.012
		(0.41)	(0.02)	(0.82)
Produced soybeans		0.001	0.004	-0.006
		(0.46)	(1.22)	(0.27)
Produced coconuts		0.006	0.009	-0.048
		(1.14)	(1.58)	(0.88)
Produced peanuts		0.005	-0.005	-0.089
		(1.20)	(1.22)	(2.13)**
Produced vegetables		-0.000	-0.006	-0.134
		(0.10)	(0.67)	(1.48)
Produced bananas		-0.000	0.002	-0.099
		(0.08)	(0.20)	(0.75)
Produced other fruit		0.000	0.004	-0.018
		(0.18)	(0.92)	(0.56)
Crops (Share of Harvest)				
Share of upland (gogo) rice		0.006	-0.016	0.307
		(0.40)	(0.83)	(0.98)
Share of rice		0.092	-0.043	0.451
		(0.73)	(0.82)	(1.03)
Share of maize		0.004	-0.017	0.370
		(0.21)	(1.09)	(0.90)

	Overall gap	Endowments	Male structural advantage	Female structural disadvantage
Share of maize (dry)		0.056	-0.089	2.207
		(0.59)	(1.02)	(1.01)
Share of cassava		0.007	-0.018	0.638
		(0.48)	(0.64)	(1.07)
Share of coffee (raw)		0.009	-0.029	0.580
		(0.32)	(0.81)	(1.02)
Share of coffee (dry)		0.001	-0.021	0.490
		(0.03)	(0.73)	(1.02)
Share of kidney beans		-0.000	-0.006	0.180
		(0.19)	(0.77)	(1.30)
Share of sweet potatoes		0.002	-0.004	0.188
		(0.49)	(0.45)	(1.07)
Share of potatoes		0.012	-0.005	0.308
		(0.70)	(0.45)	(1.16)
Share of taro		0.007	-0.020	0.394
		(0.62)	(1.05)	(0.95)
Share of squash		0.010	-0.019	0.561
		(0.41)	(0.79)	(0.97)
Share of mung beans		-0.001	-0.001	0.030
		(0.42)	(0.53)	(0.85)
Share of soybeans		0.000	-0.005	0.036
		(0.08)	(1.50)	(0.72)
Share of coconuts		0.001	-0.015	0.294
		(0.14)	(0.94)	(1.02)
Share of peanuts		-0.000	-0.006	0.208
		(0.14)	(0.58)	(1.09)
Share of vegetables		0.003	-0.006	0.316
		(0.41)	(0.44)	(1.08)
Share of bananas		-0.003	-0.019	0.397
		(0.30)	(1.05)	(1.01)
Share of other fruit		-0.001	-0.008	0.112
		(0.18)	(1.45)	(0.91)
Inputs				
Implements index		0.030	-0.002	0.005
		(2.83)***	(0.80)	(0.46)
HH cultivates by hand		0.004	-0.033	-0.401
		(0.57)	(0.69)	(2.35)**

	Overall gap	Endowments	Male structural advantage	Female structural disadvantage
HH cultivates with own animals		-0.002	-0.002	-0.006
		(0.79)	(1.37)	(1.38)
HH cultivates with rented animals		0.000	-0.001	-0.009
		(0.40)	(1.33)	(1.41)
HH cultivates with tractor		0.004	-0.015	-0.066
		(0.64)	(1.39)	(2.36)**
HH used pesticide		-0.000	0.001	-0.005
		(0.15)	(0.84)	(0.54)
HH used fertilizer		-0.000	-0.000	-0.004
		(0.25)	(0.43)	(0.91)
HH used herbicide		-0.006	-0.003	0.002
		(1.59)	(1.62)	(0.22)
HH used manure		-0.000	0.001	0.005
		(0.27)	(1.23)	(1.05)
HH used seeds		0.001	0.004	0.024
		(0.13)	(0.56)	(0.82)
Log (female HH labor hour/ha)		0.010	0.006	0.082
		(1.04)	(1.32)	(2.32)**
Log (male HH labor hours/ha)		0.001	0.002	-0.004
		(0.10)	(0.26)	(0.25)
Log (hired male labor days/ha)		0.006	0.003	0.010
		(1.75)*	(1.05)	(0.67)
Log (hired female labor days/ha)		0.000	-0.006	-0.022
		(0.39)	(1.64)	(1.28)
Log (hired child labor days/ha)		0.001	0.000	-0.002
		(0.39)	(0.09)	(0.32)

N=3,561

t statistics are in parentheses. Standard errors are clustered on enumeration area; all regressions include sub-district fixed effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$