

Bridging the Gap: Identifying What is Holding Self-Employed Women Back in Ghana, Rwanda, Tanzania, The Republic of Congo, and Uganda

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1 Introduction

The existence of a gap between male and female income is a persistent reality across the world. In order to formulate policies to bridge these gaps, it is useful to explore what may be causing the gaps. There is a large literature examining the gender income gap in developed countries like the United States. There is also a growing literature that goes beyond simple mean decompositions. For example, quantile decomposition methods were developed and applied in Gosling, Machin, and Meghir (2000) and Machado and Mata (2005). Such techniques reveal whether the size and determinants of earnings gaps vary at different points across the income distribution.

Our paper follows in the tradition of these two strains of literature by making use of a new decomposition approach developed in Firpo, Fortin, and Lemieux (2007) and applying this methodology to examine the gender income gap in five countries in Africa. To our knowledge this is the first paper that applies the Firpo, Fortin, and Lemieux (2007) methodology to examine the gender gap by quantile in these countries. Importantly, this methodology not only allows us to obtain aggregate decompositions of statistics beyond the mean, but further allows us to assess the contribution of individual covariates to the aggregate decomposition terms.

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We specifically decompose the gender gap in self-employment income. This is particularly important given that workers in the developing world, particularly in Sub-Saharan Africa, are frequently self-employed. In fact, of the adults in Sub-Saharan Africa whose primary employment is not family farming, more workers (51.4%) work in household enterprises than for wages in public or private firms or in agriculture. Fox and Sohnesen (2012).¹

Indeed, in Sub-Saharan Africa, self-employment often constitutes the only alternative outside the agriculture sector. For example, in Uganda, despite impressive growth rates, the majority of the nonagricultural employment was created in household enterprises and microenterprises (Chuhan-Pole, Angwafo, Mapi Buitano, Korman, and Fox (2011)). Women are well- represented among these smaller size businesses: in Tanzania, for instance, 80 percent of micro entrepreneurs are female (Kweka and Fox (2011)). Thus, understanding the dynamics and the determinants of earnings among male and female entrepreneurs is crucial.

This paper focuses on the role of individual traits in explaining income in five Sub-Saharan countries: the Republic of Congo, Ghana, Rwanda, Uganda, and Tanzania. While the literature has already emphasized the role of individual traits—Jovanovic (1982), for example, looks at the role of experience on the decision to enter self-employment while Fajnzylber, Maloney, and Rojas (2006) and Bates (1999) focus on the role of educational attainment on firm success— less attention has been paid to the contribution of specific traits to the gender income gap in these countries. To fill in this gap, we develop a new dataset that synthesizes data from National Household Surveys from the Republic of Congo, Ghana, Rwanda, Tanzania, and Uganda.

In the first part of the paper we show that self-employment tends to provide marginally lower average income (with the exception of Ghana and men in Rwanda) and much higher variability in income compared to wage work. Importantly, women on average earn less than men both when they are self-employed and in wage employment but also have less volatile earnings. This suggests either a difference in returns to traits or differences in average traits among self-employed men and women.

We further find that the self-employment income gap is not constant across the distribution across the five countries. This motivates our main analysis where we employ quantile decomposition methods developed in Firpo, Fortin, and Lemieux (2007).

A quantile decomposition allows us to decompose the gap in income at each quantile into the composition effect and the structural effect. The composition effect is the difference in income due to observable differences in the included set of covariates: marital status, experience, education, number of children, average monthly hours worked, and industry. The structural effect is the difference in income due to differences in returns to the same set of covariates. The structural effect can also be considered the “unexplained” portion of the gap. With the quantile decomposition method we use we are further able to decompose the composition and structural ef-

¹Overall, 18 percent of respondents worked in household enterprise.

fects by covariates. This allows us to assess the relative importance of each covariate in explaining the income gap, and how these factors vary based on low earners and high earners. Because the type of work, input and output markets, and non-work constraints faced by low and high income earners is very different, an examination of the contributions to the gender wage by income quantile is key to the policy implications we provide.

We find that the majority of the gap across the distributions for all countries is due to the structural effect. Still, the composition effect plays an important role for all countries but Uganda. In Ghana we find that the share of the gender gap explained by differences in covariates remains relatively constant across income quantiles, at around 30%. In contrast, in Congo, Rwanda and Tanzania we find that the composition effect is largest for the bottom 20%. In Congo, the composition effect explains 50% of the gap, in Rwanda it explains 48% of the gap, and in Tanzania it explains 31% of the gap at the 10th quantile. The composition effect then decreases in importance relative to the structural effect as we move across the income distribution towards the higher earners. By the 90th quantile it explains only 16% of the gap in all three countries.

Thus, while differences in observable choices and endowments play a role in causing the gap between women and men earning the least in self-employment, the gap for the most successful male and female entrepreneurs is largely driven by differences in returns to observable covariates in the Republic of Congo, Tanzania, and Rwanda. Differences in returns to a given covariate could be indicative of discrimination. However, in order to unequivocally state that the structural effect is due to discrimination, one must include all possible determinants of income in the set of covariates. We are unable to do this given our data.

We next decompose the aggregate composition and structural effects into the contributions of the individual covariates. We find that monthly hours drives the composition effect in Tanzania and Rwanda. More specifically, while gaps in monthly hours worked explains a significant portion of the income gap between low earning men and women, it explains much less of the gap between higher earning men and women. Industry drives the composition effect in the Republic of Congo and savings drives the composition effect in Ghana. Consistent with the aggregate decomposition results, the savings composition effect remains fairly constant for Ghana while the portion of the gap explained by industry differences decreases in importance for the Republic of Congo as we move to the right in the income distribution.

We conclude by highlighting the policy implications of our findings. Specifically, we argue that our results highlight the importance of observable determinants of income – namely, hours and industry – beyond standard human capital and demographic factors such as age and education. We also point out that our results from several countries suggest a glass ceiling effect, wherein a large portion of the income gaps between high-earning men and women cannot be explained by observable characteristics. We argue that these descriptive results can be tested in future research

that causally identifies determinants of earning gaps between men and women.

2 Data and Summary Statistics

For the main part of the analysis, we use nationally representative household survey data for the following countries (survey year in parenthesis): the Republic of Congo (2009, urban only), Ghana (2005), Rwanda (2005), Tanzania (2009) and Uganda (2009).

Our main dependent variable is the logarithm of monthly self employment income for the non-agricultural self-employed individuals. We calculate self employment income as wages to the owner plus profits. Profits is calculated as the difference between revenues and expenses with adjustments as recommended in the recent literature (De Mel, McKenzie, and Woodruff (2009)²). Since the survey provides minimal information, profit figures are less rigorous only in the case of Tanzania.

Concerning the explanatory variables, on the one hand, our main interest is on the role of the individual traits identified by the literature in explaining firm performance (see for example Minniti (2005)). On the other hand, to ensure consistency in the interpretation of the results across countries, we selected and harmonized as many variables as possible.

The main explanatory variables include marital status, age, education, number of children, average monthly hours worked, savings, and industry. Education consists of 8 categories: none, some primary school, completed primary school, some middle school, completed middle school, some secondary school, completed secondary school, and some college. We use age as a proxy for experience. Industry consists of the following categories: agriculture/fishing, mining/energy, manufacturing, construction, retail, trade, finance, public services, and other. Sample means for these variables by gender and country can be found in the Appendix in Tables C.1-C.5.

Table 1 provides summary statistics for these variables, pooling all cross-sectional data sets. The data are presented for the three main occupational categories available: agricultural employees, wage employees, and the self-employed. Tables A.1 - A.5 in the Appendix provide the same descriptive statistics for each country.

3 Preliminary Analysis

We start the analysis by looking at the distribution of individuals across primary occupation (agriculture, non-agricultural self employment, and non-agricultural wage work) and gender (Figure 1). Clearly, agriculture is still a very important sector in these economies. However, self-employment is a significant source of employment for

²Unfortunately, the surveys do not directly ask for profits, which is the recommended measure by De Mel, McKenzie, and Woodruff (2009)

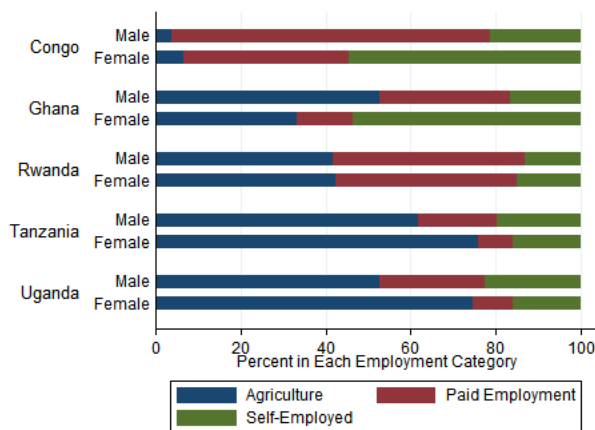
Table 1: Summary Statistics by Employment Type

	mean	sd	min	max	count
Agriculture					
Primary Income in USD	27.92	57.66	0.00	664.14	1711.00
Education (Categorical, 1-8)	3.09	1.40	1.00	8.00	29321.00
Age in Years	35.96	13.25	15.00	65.00	37012.00
Male Dummy	0.48	0.50	0.00	1.00	37012.00
Marriage Dummy	0.67	0.47	0.00	1.00	37012.00
Paid Employment					
Primary Income in USD	92.91	117.71	0.00	1138.52	13696.00
Education (Categorical, 1-8)	4.23	2.21	1.00	8.00	13346.00
Age in Years	33.73	11.49	15.00	65.00	14242.00
Male Dummy	0.69	0.46	0.00	1.00	14242.00
Marriage Dummy	0.51	0.50	0.00	1.00	14242.00
Self-Employed					
Primary Income in USD	79.95	111.59	-29.20	1138.52	10999.00
Education (Categorical, 1-8)	3.80	1.71	1.00	8.00	12384.00
Age in Years	35.33	10.93	15.00	65.00	13383.00
Male Dummy	0.47	0.50	0.00	1.00	13383.00
Marriage Dummy	0.64	0.48	0.00	1.00	13383.00
Total					
Primary Income in USD	83.30	113.31	-29.20	1138.52	26406.00
Education (Categorical, 1-8)	3.52	1.77	1.00	8.00	55051.00
Age in Years	35.34	12.46	15.00	65.00	64637.00
Male Dummy	0.52	0.50	0.00	1.00	64637.00
Marriage Dummy	0.63	0.48	0.00	1.00	64637.00
Observations	64637				

each of these countries.³ This is in line with Fox and Sohnesen (2012)) who point out that self-employment is not only a large source of employment, but also a growing sector in countries across subsaharan Africa.

There are distinct gender and country differences in occupational choices for primary employment. In Ghana, Tanzania, and Uganda very few women report paid employment as their primary form of employment. Most women in Tanzania and Uganda work in agriculture, but close to 20% report self-employment as their primary form of employment. In Ghana and the urban sample from the Republic of Congo, the majority of women report self-employment as their primary form of employment. In Rwanda, over 80% of women report agriculture and wage employment as their primary employment, with a much smaller percentage reporting self-employment as their primary form of employment. Men are more likely than women to report wage employment as their primary form of employment in all five countries.

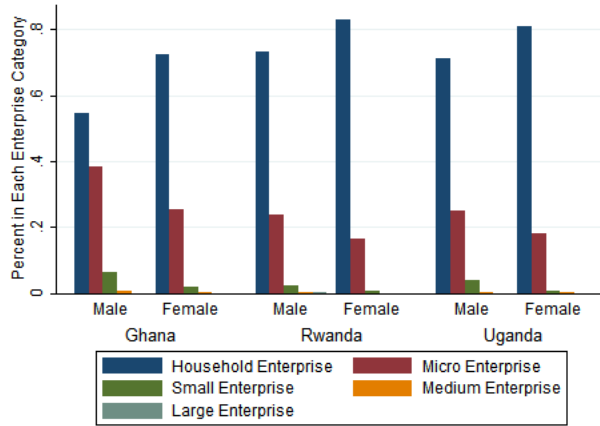
Figure 1: Percent in Agriculture, Paid Employment, and Wage Work by Country



Concerning the type of businesses under analysis, Figure 2 illustrates the percentage of male and female owners of household (defined as a business without employees), micro (1 to 4 employees), small (5 to 19 employees), medium (20-99 employees), and large (100 + employees) businesses. As the figure shows, the sample primarily consists of household and micro enterprises. Additionally, women engage in smaller size businesses compared to men.

³Note that Congo is a nationally representative urban household survey. As a result, the low percent of individuals in agriculture activities only reflects urban realities.

Figure 2: Enterprise Size by Country and Gender



We next look at the distribution of primary incomes across countries (Figure 3). As shown in these Figures and in Table 2, self-employment is characterized by far greater variability in earnings, with the exception of women in Ghana, Rwanda and Tanzania. For women, self-employment offers higher average earnings relative to wage employment only in the case of Ghana and Uganda.

Men have substantially higher average earnings than women, both in wage employment and in self-employment, but men also have greater variability in their earnings. This can be seen in Figures 4 and 5 which show income distributions by gender and country for wage workers and the self-employed, respectively. Table 2 provides the exact figures. This seems in line with the idea that women are more risk averse than men: Croson and Gneezy (2009), reviewing recent studies, suggest that women are more risk averse than men but gender differences in financial risks, for example, disappear among high level professionals (such as mutual fund managers).

Figure 3: Distribution of Log U.S. Monthly Income by Country and Employment Type

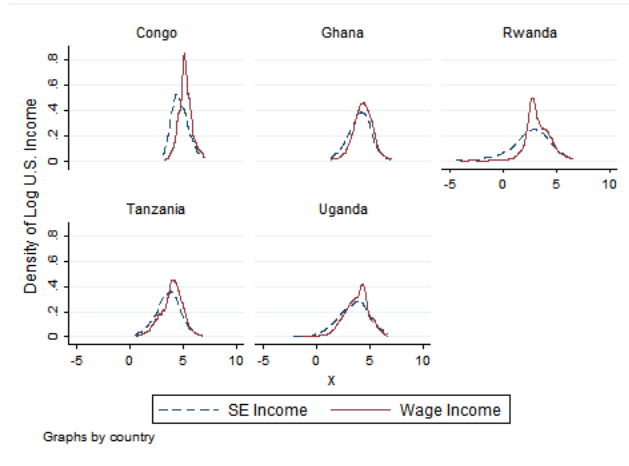


Figure 4: Distribution of Wage Workers' Log U.S. Monthly Income by Country and Gender

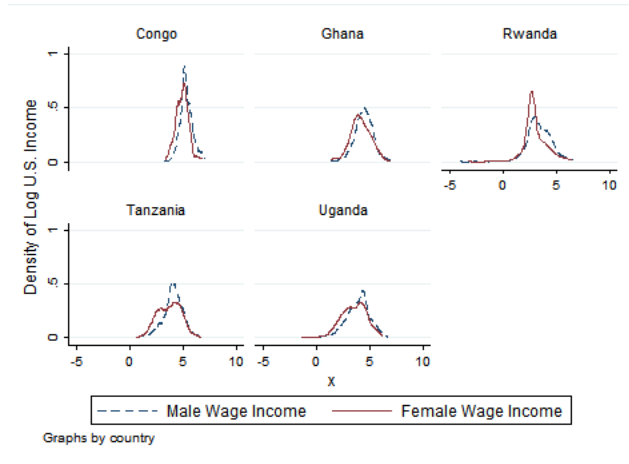


Figure 5: Distribution of Self-Employed Log U.S. Monthly Income by Country and Gender

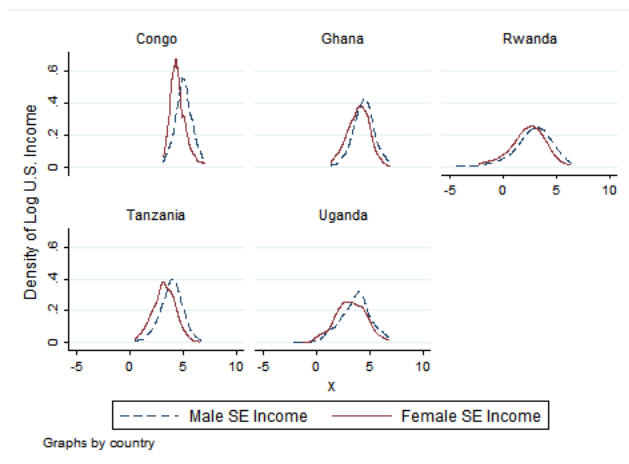


Table 2: Mean and Standard Deviation of Monthly Income in U.S. Dollars

	Wage Employment mean	sd	Self-Employment mean	sd
<i>Congo</i>				
Male Primary Income in USD	234.546	166.427	202.624	168.128
Female Primary Income in USD	163.512	123.836	120.115	130.626
<i>Ghana</i>				
Male Primary Income in USD	122.028	130.171	133.009	154.082
Female Primary Income in USD	96.032	106.076	81.966	94.586
<i>Rwanda</i>				
Male Primary Income in USD	56.031	82.960	51.661	92.554
Female Primary Income in USD	41.037	76.070	28.223	55.883
<i>Tanzania</i>				
Male Primary Income in USD	86.680	100.788	83.225	104.557
Female Primary Income in USD	69.843	87.497	44.753	69.434
<i>Uganda</i>				
Male Primary Income in USD	82.825	96.577	85.130	132.718
Female Primary Income in USD	61.035	75.979	56.695	104.856

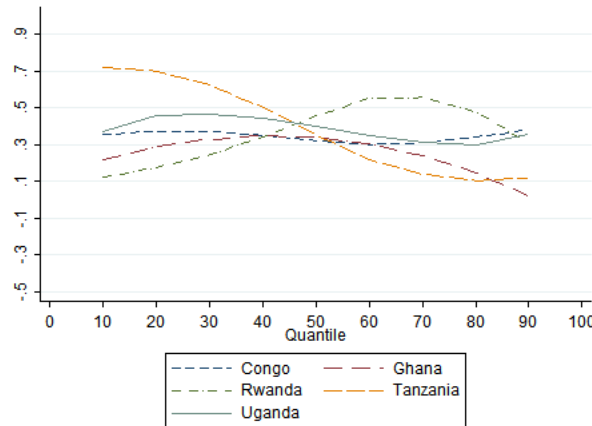
In all countries, the gender gap in self employment earnings is large in magnitude and statistically significant: on average self-employed men in the Republic of Congo make \$203 a month compared to \$120 for women; in Ghana self-employed men make \$133 a month compared to \$82 for self-employed women; in Rwanda, self-employed

men on average make \$52 a month compared to \$28 for self-employed women. In Tanzania, self-employed men on average make \$83 a month compared to \$45 for self-employed women. Finally, in Uganda self-employed men make \$85 a month compared to \$57 for self-employed women.

Looking at the gender gap along the income distribution of self-employed individuals (Figure 7), we observe a positive gap between male and female self-employed income across all income quantiles for the Republic of Congo, Ghana, Rwanda, Tanzania and Uganda⁴. Figure 6 shows the gender income gap by quantile for wage workers, which is also positive for all countries for all quantiles.

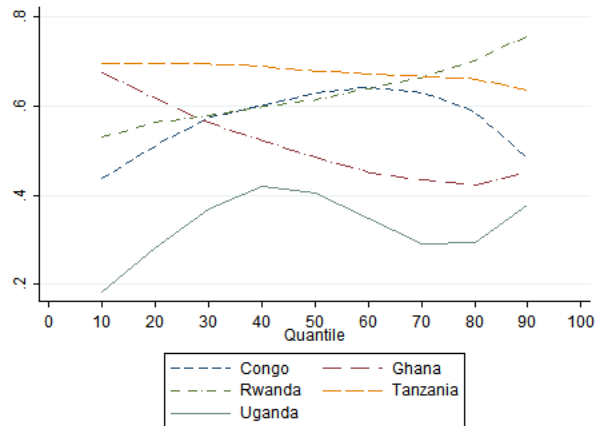
To sum up, with the exception of Ghana, the gap is significantly higher across all quantiles for self-employed workers compared to the gap for wage workers. In the next section, we thus focus on the gender income gap among self-employed men and women.

Figure 6: Raw Male-Female Wage Employment Income Gap by Country



⁴To understand what Figure 7 shows us, think of lining all men up in order of their income, and the same for women. Then think of dividing the line into 10 groups, where the first group is the bottom 10% in terms of their income, the second group is the next 10% in income, and so on. Figure 7 takes the maximum income for men in each of these 10 quantile groups and subtracts the equivalent number for women.

Figure 7: Raw Male-Female Self-Employment Income Gap by Country



4 Gender Decomposition of Profits

In this section, we look at the role of individual traits in explaining observed gender gaps in self-employment. We present quantile decompositions of self-employment income, using the decomposition procedure developed by Firpo, Fortin, and Lemieux (2007). The goal of the decomposition is to look at differences in an outcome (here self-employment income) at different points in the income distribution across two groups and separately identify how much of the gap is explained by differences in endowments and how much of the gap is explained by differences in returns to those endowments.

For example, consider education. A decomposition could be used to establish what part of the gender gap in income is due to observable differences in education levels across men and women (which would arise if men have more schooling than women and there are positive returns to schooling) and what part of the gender difference is due to different returns to a given education level for men and women. Different returns to men and women with the same characteristics could be indicative of discrimination in the labor market, but could also be due to omitted variable bias if these characteristics are correlated with unobserved determinants of income, such as ability. Given that it is impossible with the given data set to include all determinants of income in our analysis, differences in returns to the same endowments for men and women should not be taken as evidence of discrimination. Instead, it shows that discrimination may be happening, or there may be an omitted variable that is driving the results. In keeping with Firpo, Fortin, and Lemieux (2007), we define the part of the gender income gap explained by differences in endowments to be the composition effect and the part of the gender income gap explained by differences in returns to

endowments to be the structural effect.

4.1 RIF Decomposition Methodology

In the traditional Oaxaca-Blinder mean decomposition, the difference in average income is decomposed into structural and compositional components in the following way. First, assume that income, Y , depends linearly on a set of covariates, X . This implies that we can write Y_{gi} where g stands for gender and i stands for observation in the following way.

$$Y_{gi} = \alpha_g + \sum_{k=1}^K X_{ik} \beta_{gk} + \nu_{gi}, \quad g = F, M \quad (1)$$

Where ν_{gi} is the error term and the expected value of the error, conditional on X , is 0 ($E[\nu_{gi}|X_i] = 0$). Define the difference in average income to be

$$D = E[Y_m] - E[Y_f] \quad (2)$$

where Y_f is female income and Y_m is male income. We can decompose this difference into structural and compositional components by estimating Equation 1, which allows us to rewrite Equation 2 as

$$D = E[Y_m] - E[Y_f] = \underbrace{(\widehat{\alpha}_m - \widehat{\alpha}_f) + \sum_{k=1}^K E[X_{mk}] (\widehat{\beta}_m - \widehat{\beta}_f)}_{\widehat{\Delta}_s = \text{unexplained}} + \underbrace{\sum_{k=1}^K (E[X_{mk}] - E[X_{fk}]) \widehat{\beta}_f}_{\widehat{\Delta}_c = \text{explained}} \quad (3)$$

Here, $\widehat{\Delta}_s$ gives the aggregate structural portion of the wage gap while $\widehat{\Delta}_c$ tells us what portion of the gender income gap can be explained by differences in the covariates X . We can also estimate more detailed results that give the contribution of each covariate to the aggregated structural and compositional effects.

However, this approach only works for mean decompositions. To obtain both an aggregate and detailed decomposition by quantile we use a new econometric approach described in Fortin, Lemieux, and Firpo (2011). The approach proceeds in two steps.

In the first step we estimate recentered influence functions (RIF, see Firpo, Fortin, and Lemieux (2009)) for the quantiles. The RIF we use is:

$$RIF(Y, Q_\tau) = Q_\tau + \frac{\tau - \mathbf{1}\{y \leq Q_\tau\}}{f_y(Q_\tau)} \quad (4)$$

where $\mathbf{1}\{\}$ is an indicator function, $f_y(\cdot)$ is the density of the marginal density of Y , and Q_τ is the population τ -quantile of the unconditional distribution of Y , as in (Fortin, Lemieux, and Firpo (2011), 77).

In the second step we decompose the gender income gap in the same way that we would do for the mean, but with income, Y_f and Y_m replaced with the RIF parameters, obtaining the following equations.

In the second step we decompose the gender income gap in the same way that we would do for the mean, but with income, Y_f and Y_m replaced with the RIF parameters, obtaining the following equations.

$$D = E[Y_m] - E[Y_f] = \underbrace{(\widehat{\alpha}_m - \widehat{\alpha}_f) + \sum_{k=1}^K E[X_{mk}] (\widehat{\beta}_m - \widehat{\beta}_f)}_{\widehat{\Delta}_s = \text{structural effects}} + \underbrace{\sum_{k=1}^K E[X_{mk}] - E[X_{fk}^c] \widehat{\beta}_f}_{\widehat{\Delta}_c = \text{composition effects}} \quad (5)$$

We do not compute a reweighted-regression decomposition since reweighting procedures are not simple to extend to detailed decompositions, which we are particularly interested in for this paper. Reweighting should be used if the conditional mean is nonlinear. Thus, as pointed out above, we assume a linear wage equation holds in this context. In summary, the RIF technique allow us to perform detailed compositions using the estimated coefficients.

4.2 Quantile Decomposition Results

As described in the data section, we include the following covariates in our decomposition analysis: marital status, experience (proxied by age), education, number of children, average monthly hours worked, savings, and industry⁵. We use all of the covariates for Ghana. For Rwanda, Tanzania, and the Republic of Congo we are unable to include savings, as there are insufficient observations on savings. For Uganda we do not have data on hours worked so we do not include average monthly hours worked. The base group used for the decomposition is unmarried men in agriculture/fishing who did not complete primary school and who do not have a savings account.

4.2.1 Aggregate Decomposition Results

Figures 8 and 9 show the results for the aggregate decomposition. For each country, the total log monthly income gap is graphed by quantile along with the amount explained by the composition effect and the amount explained by the structural effect. Numerical results are presented in Tables D.1 - D.5 in the Appendix. These tables also include the percent of the overall explained by the composition effect versus the

⁵An additional covariate we were not able to include in the analysis but that may be of interest for future research is risk aversion. Average self-employment earnings for men are larger but more volatile than self-employment earnings for women. It would be interesting to apply the decomposition methodology we present here for quantiles to decompose the variance of self-employment earnings with this variable. We do not decompose the variance of earnings in this paper, though it is possible to do so using the decomposition method outlined in the previous subsection.

structural effect. The standard errors reported in these tables are computed via a nonparametric bootstrap with 100 replications. In what follows, we will describe the results by country highlighting both patterns common across countries and significant divergences from these patterns.

In the Republic of Congo, the gender income gap in self-employment is increasing across the distribution. The majority of the gap is explained by the structural effect, which is also increasing. By contrast, the fraction of the gap explained by the composition effect is smaller overall and decreasing across the distribution. In fact, the fraction explained by the composition effect decreases from 50.5% in the 10th quantile to 16.2% in the 90th quantile.

In contrast, the gender income gap is decreasing across the distribution for Ghana. Both the composition effect and the structural effect are also decreasing across the distribution. As a consequence, the share of the gap explained by the composition effect remains relatively constant across the distribution, at around 30%.

Decomposition estimates for Rwanda are less precise. Similarly to the Republic of Congo, the gap is increasing across the distribution. Also similar to the Republic of Congo, the share explained by the composition effect decreases as we move to the right of the distribution, from 46.04% at the 10th quantile to 15.95% at the 90th quantile.

In Tanzania, the overall gap is decreasing across the distribution, as was the case in Ghana, from a gap of 0.73 at the 10th quantile to a gap of 0.61 at the 90th quantile. However, unlike in Ghana, the structural effect remains relatively steady while the composition effect decreases across the distribution. As a result, the share of the gap explained by the composition effect decreases across the distribution, from 31% at the 10th quantile to 16.2% at the 90th quantile. In this regard, Tanzania is similar to both the Republic of Congo and Rwanda.

Last, in Uganda the income gap between self-employed men and women is u-shaped from the 10th to the 80th quantile, at which point it increases sharply. This is quite different from the other four countries. Interestingly, in Uganda the entire gap is due to the structural effect and is effectively “unexplained”. In fact, the composition effect is actually marginally negative across the distribution, though it is statistically indistinguishable from zero.

Figure 8: Decomposition of Total Gender Self-Employment Income Gap into Composition and Structural Effects

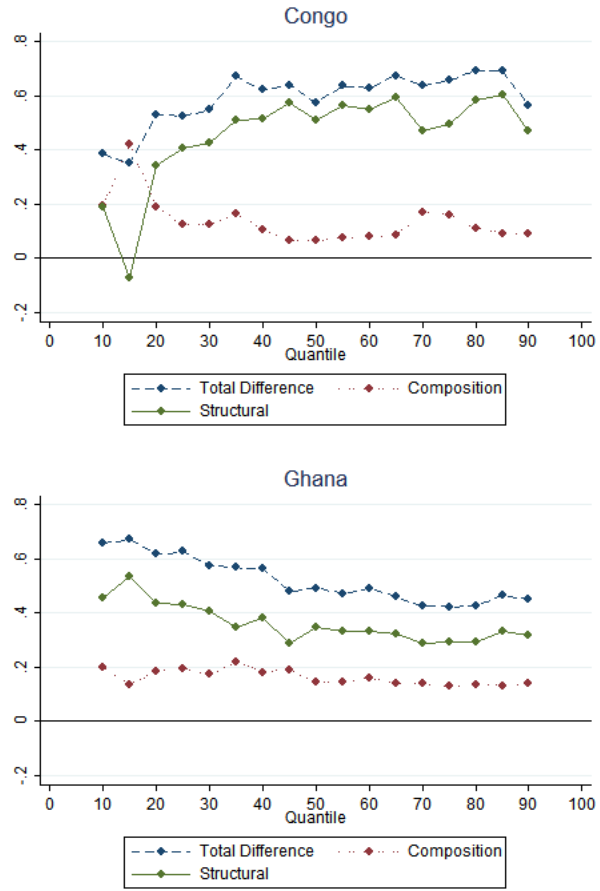
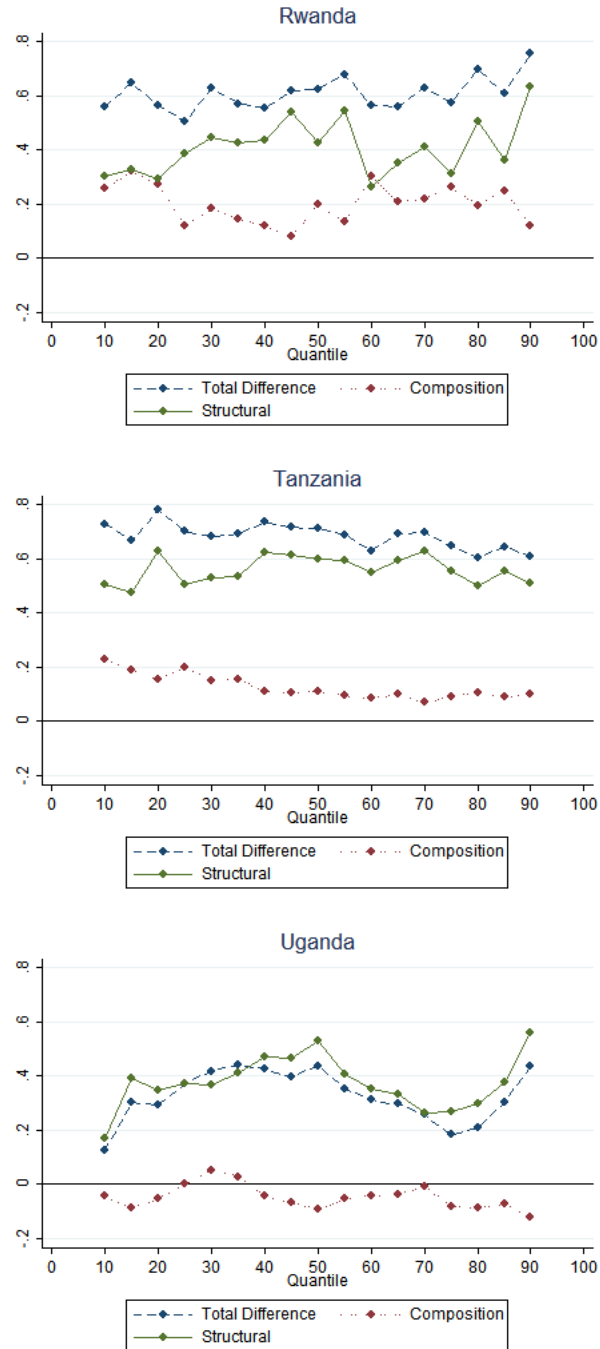


Figure 9: Decomposition of Total Gender Self-Employment Income Gap into Composition and Structural Effects



4.2.2 Detailed Decomposition Results

Figures 10 and 11 show the contributions of the individual covariates to the composition effect. In the Republic of Congo, differences in choice of industry across men and women is the single most important driver of composition effects for the bottom 50%. In keeping with the aggregate results for the Republic of Congo, where we saw the overall gap attributable to the composition effect decrease over the distribution, industry decreases in importance as we move across the distribution. Differences in education levels and monthly hours worked are the next two most important contributors to the composition effect, though both variables are far less important compared to industry.

In Ghana, savings drives the largest component of the composition effect,⁶ followed by monthly hours worked and industry. While the contribution of savings to the gap increases across the distribution, the contribution of monthly hours and industry decrease marginally. This could indicate that savings is more important for self-employed at the higher end of the distribution, when capital may be necessary to expand businesses. However, an important caveat to these results is reverse causality, since many models of intertemporal optimization would predict that savings rates increase in business earnings. Still, it is interesting that relationship between savings and earnings is stronger at higher quantiles, possibly indicating that lower earners are liquidity constrained and spend all their business earnings.

In both Rwanda and Tanzania, monthly hours is by far and away the most important covariate. In Rwanda, married has a slight contribution and industry actually contributes negatively to the composition effect while all other covariates' contributions are essentially zero. In Tanzania all other covariates' contributions are essentially zero.

Consistent with the aggregate results, where we saw the contribution of the composition effect to the overall gap decrease across the distribution, we see that the contribution of monthly hours decreases across the distributions for both Rwanda and Tanzania. This implies that while differences in hours worked accounts for sizable share of the overall gap for the lower quantiles, at higher quantiles there is only a very marginal composition explanation, given our covariates, that can explain the gender income gap at the top of the distribution in Rwanda and Tanzania.

As discussed above, in Uganda the composition effect is marginally negative overall across the distribution, though it is not statistically different from zero. In Figure 11 we see that this is driven by differences in industry choices between self-employed men and women and differences in the number of women who have savings accounts compared to men.

Figures 12 and 13 break down the aggregate structural effect into the contribu-

⁶It is important to note that savings could also play an important role in the Republic of Congo, Tanzania and Rwanda, but unfortunately we had too much missing data on savings for these countries to include it as a covariate in the decomposition analysis.

tion of each covariate. In the Republic of Congo and Ghana, education appears to contribute the most to the overall structural effect. In Rwanda and Tanzania, difference in returns to the same industry contribute the most to the structural effect, particularly at the top of the distribution of self-employment income gaps. In Uganda, differences in the returns to savings accounts contributes the most to the structural effect.

Figure 10: Detailed Decomposition of Composition Effects by Country

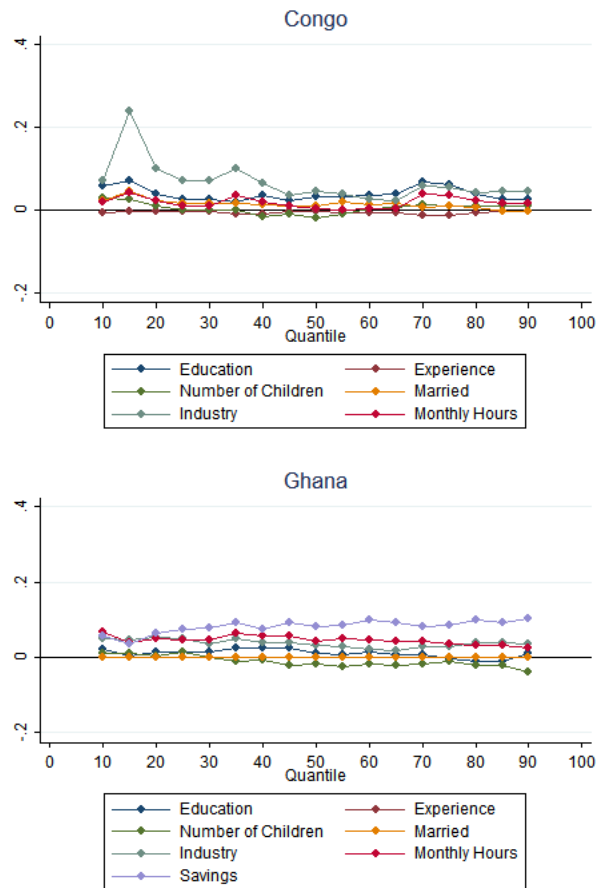


Figure 11: Detailed Decomposition of Composition Effects by Country

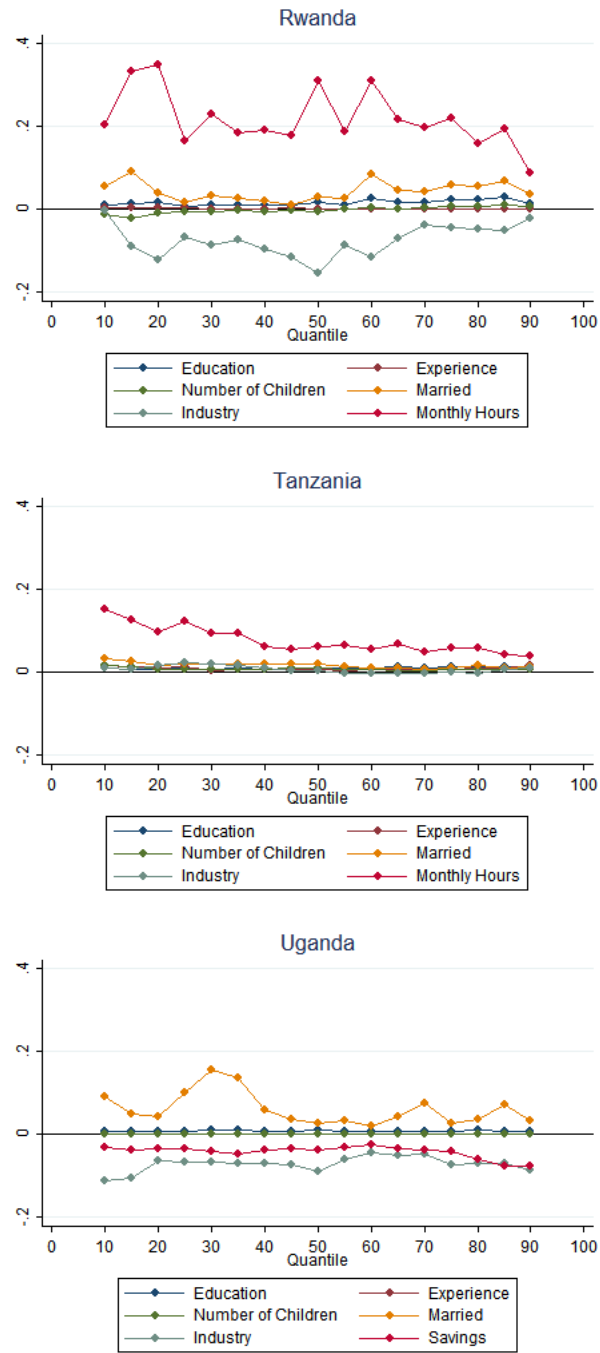


Figure 12: Detailed Decomposition of Structural Effects by Country

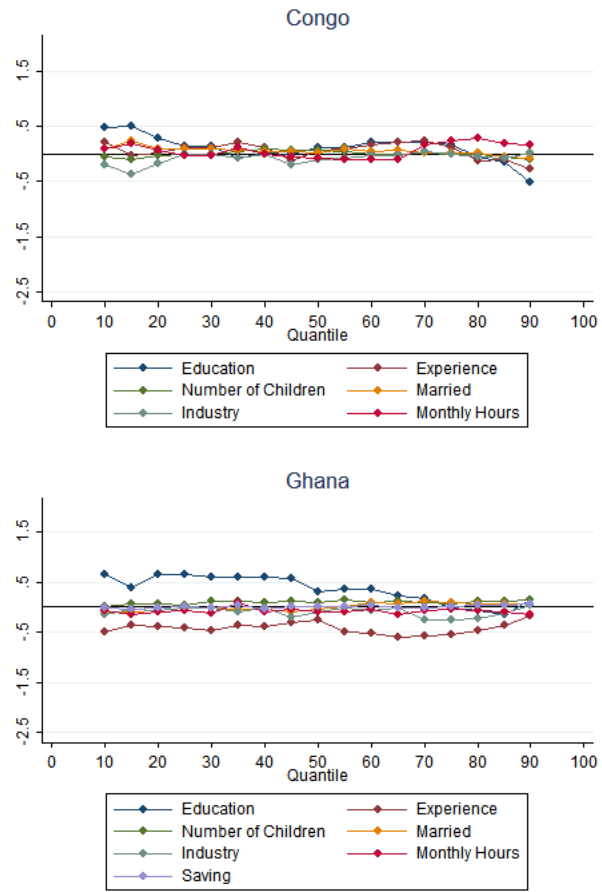
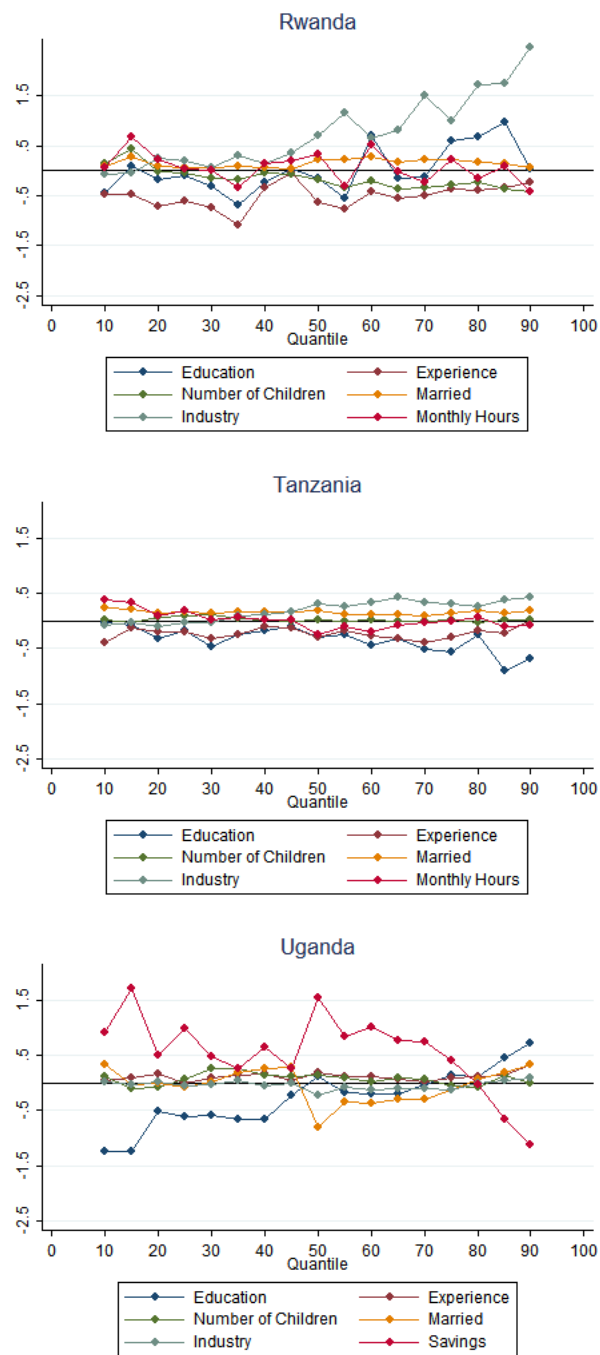


Figure 13: Detailed Decomposition of Structural Effects by Country



5 Conclusion

This paper analyzes the role of individual traits and choices on self-employment income gaps between men and women who own businesses. The analysis based on the Republic of Congo, Ghana, Rwanda, Tanzania and Uganda shows that a classification of entrepreneurs based on broad categories (such as the size of the business) provides a useful categorization. However the relevance of individual specific traits demonstrated so far in this paper shows that additionally considering the traits of individual entrepreneurs helps researchers and policy makers identify the sources of income gaps.

Looking at business profitability, the analysis shows that differences in endowments of traditional traits such as education, experience, and marriage (which can be seen as a proxy for time availability) do not do a good job in explaining income gaps. This is despite the fact that there are clear differences in relative endowments in these traits when we look at the raw data.⁷ However, while composition effects overall do not explain the majority of the gap, they do play an important role in explaining aggregate income gaps (with the exception of Uganda).⁸ In place of traditional traits such as education, experience, and marriage, we find that the composition effect acts primarily through covariates such as industry, savings, and monthly hours worked.

In Ghana, we find that the share of the gap accounted for by differences in endowments is constant across the distribution. Interestingly, while differences in monthly hours and industry choices play a role in explaining the composition effect, the most important covariate is savings. The contribution of savings to the overall gap increases across the distribution. This may indicate that women at the top of the female self-employment distribution lag behind the top earning self-employed men due to financial constraints in Ghana.

In contrast, we find that the composition effect explains a decreasing share of the income gap for the Republic of Congo, Rwanda and Tanzania. The fact that the gender income gap is increasing (or moderately decreasing in Tanzania) while the share of the gap explained by the composition effect is decreasing may indicate a “glass ceiling” for women in the Republic of Congo, Rwanda, and Tanzania which is associated with discrimination against women at the top end of the earnings distribution. Unexplained differences in returns to the same endowments could be due to discrimination; and in the Republic of Congo, Rwanda, and Tanzania, more of the gap is due to unexplained differences in returns to the same endowments at the top of the income distribution.⁹

We view our primary policy implications as two-fold. Firstly, our results highlight

⁷See Tables C.1-C.5 in the appendix.

⁸In Uganda the entire gap is due to the structural effect.

⁹However, we stress again that while discrimination could be the root cause of the structural effect, we cannot definitively attribute the structural effect to discrimination. This is the case unless we are able to include all possible determinants of income in the set of covariates, which is not possible with our data.

the fact that determinants of earnings gaps between men and women vary across the earnings distribution. Accordingly, policymakers who seek to close the gap between high earning businesses should target different variables than if they are trying to help low-earning businesses become more successful. Secondly, while our results are descriptive, we hope they will motivate future research on the causal determinants of earnings gaps between men and women. For instance, we argue that the increasing role of structural factors across the earnings distribution in the Republic of the Congo, Rwanda, and Tanzania suggests that a glass ceiling is holding back female entrepreneurs in these countries. Future research could test whether this glass ceiling is indeed in place by examining differences in determinants of business success such as access to inputs, business networks, and consumers. Additionally, future data collection efforts could collect information on determinants of profits such as risk aversion, ability (both cognitive and non-cognitive), and discount rates, allowing researchers to confirm that the structural differences hold up to controls for a wider range of observable differences in profits. Overall, we hope that our results contributes to both academics and policymakers interested in understanding and closing earnings gaps between male and female entrepreneurs.

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A Summary Statistics by Country

Table A.1: Congo Summary Statistics by Employment Type

	mean	sd	min	max	count
Agriculture					
Primary Income in USD	153.59	101.00	22.77	664.14	118.00
Education (Categorical, 1-8)	3.95	2.33	1.00	8.00	130.00
Age in Years	43.17	11.65	17.00	65.00	130.00
Marriage Dummy	0.66	0.48	0.00	1.00	130.00
Paid Employment					
Primary Income in USD	217.16	159.98	24.67	1138.52	1626.00
Education (Categorical, 1-8)	6.29	1.71	1.00	8.00	1657.00
Age in Years	37.72	9.76	15.00	65.00	1657.00
Marriage Dummy	0.65	0.48	0.00	1.00	1657.00
Self-Employed					
Primary Income in USD	152.32	151.76	22.77	1138.52	884.00
Education (Categorical, 1-8)	5.05	2.06	1.00	8.00	920.00
Age in Years	36.60	10.17	17.00	65.00	921.00
Marriage Dummy	0.62	0.49	0.00	1.00	921.00
Total					
Primary Income in USD	192.49	158.16	22.77	1138.52	2628.00
Education (Categorical, 1-8)	5.76	1.99	1.00	8.00	2707.00
Age in Years	37.60	10.08	15.00	65.00	2708.00
Marriage Dummy	0.64	0.48	0.00	1.00	2708.00
Observations	2708				

Table A.2: Ghana Summary Statistics by Employment Type

	mean	sd	min	max	count
Agriculture					
Primary Income in USD	.	.	.	.	0.00
Education (Categorical, 1-8)	5.01	1.44	1.00	8.00	4467.00
Age in Years	41.51	12.07	15.00	65.00	4467.00
Male Dummy	0.65	0.48	0.00	1.00	4467.00
Marriage Dummy	0.68	0.47	0.00	1.00	4467.00
Paid Employment					
Primary Income in USD	115.06	124.68	3.71	1098.90	2239.00
Education (Categorical, 1-8)	6.01	1.70	1.00	8.00	2312.00
Age in Years	37.06	11.35	15.00	65.00	2312.00
Male Dummy	0.73	0.44	0.00	1.00	2312.00
Marriage Dummy	0.53	0.50	0.00	1.00	2312.00
Self-Employed					
Primary Income in USD	94.75	114.60	3.68	1060.88	3015.00
Education (Categorical, 1-8)	5.03	1.56	1.00	8.00	3437.00
Age in Years	37.68	10.92	15.00	65.00	3437.00
Male Dummy	0.27	0.44	0.00	1.00	3437.00
Marriage Dummy	0.62	0.49	0.00	1.00	3437.00
Total					
Primary Income in USD	103.40	119.42	3.68	1098.90	5254.00
Education (Categorical, 1-8)	5.24	1.60	1.00	8.00	10216.00
Age in Years	39.21	11.71	15.00	65.00	10216.00
Male Dummy	0.54	0.50	0.00	1.00	10216.00
Marriage Dummy	0.62	0.48	0.00	1.00	10216.00
Observations	10216				

Table A.3: Rwanda Summary Statistics by Employment Type

	mean	sd	min	max	count
Agriculture					
Primary Income in USD	.	.	.	.	0.00
Education (Categorical, 1-8)	1.95	0.92	1.00	8.00	3801.00
Age in Years	40.55	12.42	15.00	65.00	3973.00
Male Dummy	0.60	0.49	0.00	1.00	3973.00
Marriage Dummy	0.52	0.50	0.00	1.00	3973.00
Paid Employment					
Primary Income in USD	50.25	80.69	0.00	716.85	4158.00
Education (Categorical, 1-8)	2.85	1.97	1.00	8.00	3974.00
Age in Years	30.74	11.53	15.00	65.00	4197.00
Male Dummy	0.62	0.49	0.00	1.00	4197.00
Marriage Dummy	0.35	0.48	0.00	1.00	4197.00
Self-Employed					
Primary Income in USD	41.95	80.24	-12.32	716.85	1004.00
Education (Categorical, 1-8)	2.58	1.37	1.00	8.00	1226.00
Age in Years	32.99	10.81	15.00	65.00	1332.00
Male Dummy	0.57	0.50	0.00	1.00	1332.00
Marriage Dummy	0.48	0.50	0.00	1.00	1332.00
Total					
Primary Income in USD	48.63	80.67	-12.32	716.85	5162.00
Education (Categorical, 1-8)	2.43	1.58	1.00	8.00	9001.00
Age in Years	35.16	12.69	15.00	65.00	9502.00
Male Dummy	0.60	0.49	0.00	1.00	9502.00
Marriage Dummy	0.44	0.50	0.00	1.00	9502.00
Observations	9502				

Table A.4: Tanzania Summary Statistics by Employment Type

	mean	sd	min	max	count
Agriculture					
Primary Income in USD	.	.	.	.	0.00
Education (Categorical, 1-8)	2.84	0.59	1.00	8.00	14463.00
Age in Years	34.40	13.27	15.00	65.00	20097.00
Male Dummy	0.45	0.50	0.00	1.00	20097.00
Marriage Dummy	0.67	0.47	0.00	1.00	20097.00
Paid Employment					
Primary Income in USD	81.50	97.20	1.77	885.74	3673.00
Education (Categorical, 1-8)	3.77	1.44	1.00	8.00	3660.00
Age in Years	34.40	11.61	15.00	65.00	3872.00
Male Dummy	0.69	0.46	0.00	1.00	3872.00
Marriage Dummy	0.56	0.50	0.00	1.00	3872.00
Self-Employed					
Primary Income in USD	66.27	92.75	1.55	916.74	4533.00
Education (Categorical, 1-8)	3.14	0.83	1.00	8.00	4653.00
Age in Years	34.01	10.65	15.00	65.00	5170.00
Male Dummy	0.55	0.50	0.00	1.00	5170.00
Marriage Dummy	0.63	0.48	0.00	1.00	5170.00
Total					
Primary Income in USD	73.09	95.06	1.55	916.74	8206.00
Education (Categorical, 1-8)	3.05	0.90	1.00	8.00	22776.00
Age in Years	34.33	12.63	15.00	65.00	29139.00
Male Dummy	0.50	0.50	0.00	1.00	29139.00
Marriage Dummy	0.65	0.48	0.00	1.00	29139.00
Observations	29139				

Table A.5: Uganda Summary Statistics by Employment Type

	mean	sd	min	max	count
Agriculture					
Primary Income in USD	18.61	39.55	0.00	617.63	1593.00
Education (Categorical, 1-8)	2.95	1.63	1.00	8.00	6460.00
Age in Years	34.44	12.87	15.00	65.00	8345.00
Male Dummy	0.41	0.49	0.00	1.00	8345.00
Marriage Dummy	0.72	0.45	0.00	1.00	8345.00
Paid Employment					
Primary Income in USD	76.77	91.82	0.00	891.09	2000.00
Education (Categorical, 1-8)	4.02	2.15	1.00	8.00	1743.00
Age in Years	31.73	10.55	15.00	65.00	2204.00
Male Dummy	0.72	0.45	0.00	1.00	2204.00
Marriage Dummy	0.57	0.50	0.00	1.00	2204.00
Self-Employed					
Primary Income in USD	74.54	123.81	-29.20	898.37	1563.00
Education (Categorical, 1-8)	3.41	1.88	1.00	8.00	2148.00
Age in Years	35.61	11.18	15.00	65.00	2523.00
Male Dummy	0.58	0.49	0.00	1.00	2523.00
Marriage Dummy	0.76	0.43	0.00	1.00	2523.00
Total					
Primary Income in USD	58.12	95.38	-29.20	898.37	5156.00
Education (Categorical, 1-8)	3.22	1.83	1.00	8.00	10351.00
Age in Years	34.21	12.25	15.00	65.00	13072.00
Male Dummy	0.49	0.50	0.00	1.00	13072.00
Marriage Dummy	0.70	0.46	0.00	1.00	13072.00
Observations	13072				

B Distribution of Self-Employment Income by Gender

Figure B.1: Distribution of Income by Gender

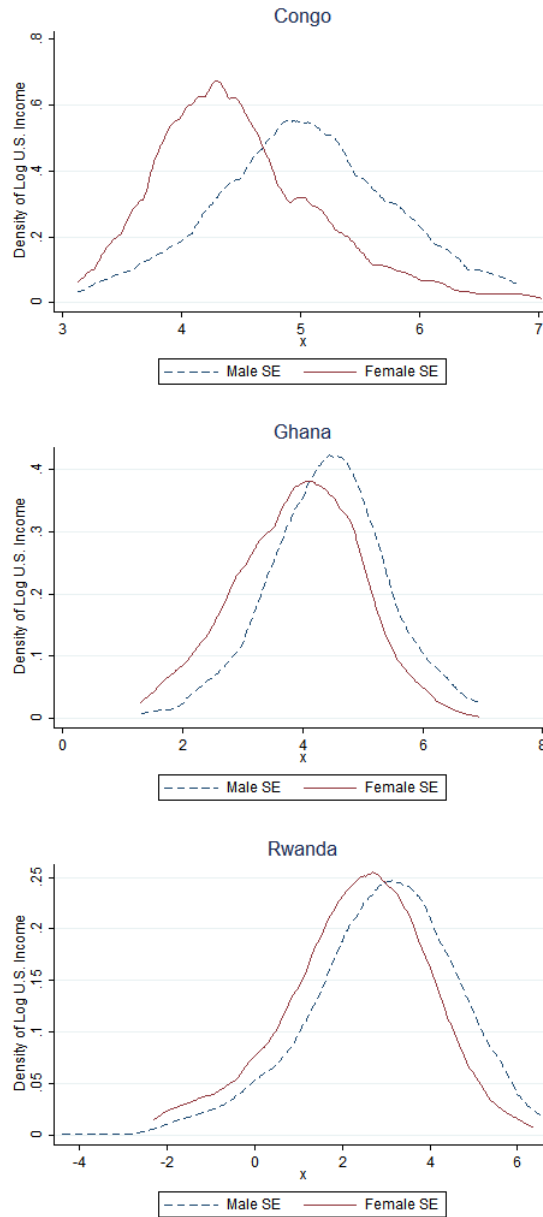
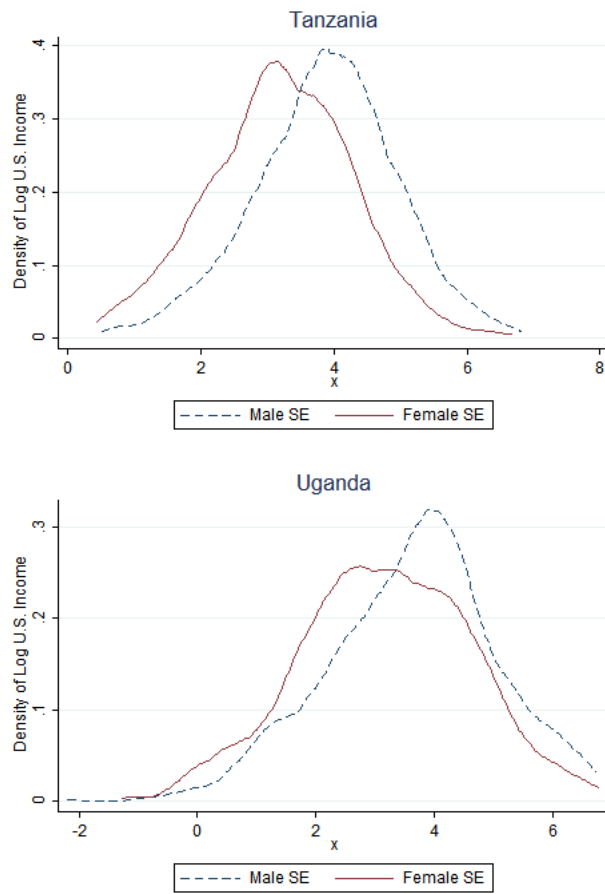


Figure B.2: Distribution of Income by Gender



C Sample Means for Covariates in the Decomposition

Table C.1: Gender Level Descriptive Statistics for Endowments in Congo

	Pooled mean	Male mean	Female mean
<i>Outcome Variable</i>			
Log Monthly Income in USD	4.962	5.140	4.653
<i>Demographics</i>			
Education (Categorical, 1-8)	5.511	5.827	5.212
Age in Years	32.170	32.865	31.513
Marriage Dummy	0.487	0.489	0.486
Number of Children	1.590	1.439	1.733
<i>Industry</i>			
industry==Agriculture/Fishing	0.038	0.030	0.051
industry==Mining/Nat.Res/Energy	0.032	0.043	0.012
industry==Manufacturing	0.110	0.114	0.103
industry==Construction	0.079	0.124	0.004
industry==Wholesale/retail	0.316	0.214	0.488
industry==Transp./Communication	0.114	0.175	0.014
industry==Finance/Real State	0.012	0.011	0.014
industry==Public services	0.092	0.073	0.125
industry==Other services	0.206	0.216	0.189
savings	.	.	.
prim_monthlyhours	195.904	206.399	178.422

Table C.2: Gender Level Descriptive Statistics for Endowments in Ghana

	Pooled mean	Male mean	Female mean
<i>Outcome Variable</i>			
Log Monthly Income in USD	4.173	4.430	3.958
<i>Demographics</i>			
Education (Categorical, 1-8)	5.116	5.151	5.086
Age in Years	32.920	32.585	33.218
Marriage Dummy	0.466	0.438	0.491
Number of Children	2.245	2.128	2.349
<i>Industry</i>			
industry==Agriculture/Fishing	0.020	0.046	0.010
industry==Mining/Nat.Res/Energy	0.013	0.028	0.006
industry==Manufacturing	0.343	0.315	0.354
industry==Construction	0.003	0.009	0.001
industry==Wholesale/retail	0.496	0.433	0.522
industry==Transp./Communication	0.046	0.026	0.054
industry==Finance/Real State	0.020	0.061	0.003
industry==Public services	0.000	0.000	0.000
industry==Other services	0.060	0.082	0.051
savings	0.121	0.151	0.095
prim_monthlyhours	175.592	189.521	162.863

Table C.3: Gender Level Descriptive Statistics for Endowments in Rwanda

	Pooled mean	Male mean	Female mean
<i>Outcome Variable</i>			
Log Monthly Income in USD	3.150	3.318	2.888
<i>Demographics</i>			
Education (Categorical, 1-8)	2.501	2.651	2.374
Age in Years	30.467	30.118	30.767
Marriage Dummy	0.357	0.378	0.339
Number of Children	2.810	2.762	2.850
<i>Industry</i>			
industry==Agriculture/Fishing	0.004	0.007	0.000
industry==Mining/Nat.Res/Energy	0.024	0.038	0.005
industry==Manufacturing	0.102	0.107	0.096
industry==Construction	0.008	0.013	0.000
industry==Wholesale/retail	0.686	0.581	0.824
industry==Transp./Communication	0.049	0.081	0.007
industry==Finance/Real State	0.005	0.008	0.000
industry==Public services	0.002	0.003	0.002
industry==Other services	0.121	0.163	0.066
savings	0.441	0.504	0.346
prim_monthlyhours	111.026	124.021	100.149

Table C.4: Gender Level Descriptive Statistics for Endowments in Tanzania

	Pooled mean	Male mean	Female mean
<i>Outcome Variable</i>			
Log Monthly Income in USD	3.727	3.946	3.370
<i>Demographics</i>			
Education (Categorical, 1-8)	3.066	3.100	3.030
Age in Years	32.529	32.769	32.312
Marriage Dummy	0.586	0.574	0.597
Number of Children	2.479	2.428	2.525
<i>Industry</i>			
industry==Agriculture/Fishing	0.016	0.025	0.008
industry==Mining/Nat.Res/Energy	0.035	0.059	0.009
industry==Manufacturing	0.181	0.151	0.213
industry==Construction	0.026	0.049	0.001
industry==Wholesale/retail	0.672	0.621	0.727
industry==Transp./Communication	0.020	0.039	0.001
industry==Finance/Real State	0.005	0.009	0.001
industry==Public services	0.024	0.031	0.018
industry==Other services	0.020	0.016	0.023
savings	.	.	.
prim_monthlyhours	185.441	199.926	171.678

Table C.5: Gender Level Descriptive Statistics for Endowments in Uganda

	Pooled mean	Male mean	Female mean
<i>Outcome Variable</i>			
Log Monthly Income in USD	3.152	3.366	2.748
<i>Demographics</i>			
Education (Categorical, 1-8)	3.262	3.449	3.070
Age in Years	30.116	30.112	30.119
Marriage Dummy	0.533	0.516	0.549
Number of Children	3.193	3.089	3.290
<i>Industry</i>			
industry==Agriculture/Fishing	0.732	0.661	0.800
industry==Mining/Nat.Res/Energy	0.002	0.004	0.001
industry==Manufacturing	0.041	0.055	0.028
industry==Construction	0.016	0.033	0.001
industry==Wholesale/retail	0.103	0.103	0.103
industry==Transp./Communication	0.023	0.043	0.003
industry==Finance/Real State	0.006	0.009	0.003
industry==Public services	0.008	0.013	0.003
industry==Other services	0.068	0.078	0.059
savings	0.203	0.206	0.200
prim_monthlyhours	.	.	.

D Aggregate Decomposition Results

Table D.1: Gender Level Descriptive Statistics for Endowments in Congo

	10th	20th	30th	40th	50th	60th	70th	80th	90th
	mean	mean	mean	mean	mean	mean	mean	mean	mean
Total Difference	0.386	0.531	0.548	0.622	0.577	0.630	0.637	0.695	0.564
(Std Error)	0.057	0.054	0.058	0.075	0.047	0.056	0.106	0.064	0.111
Composition Effect	0.195	0.190	0.122	0.106	0.064	0.079	0.168	0.112	0.092
(Std Error)	0.095	0.122	0.072	0.072	0.047	0.044	0.102	0.074	0.083
Share of Gender Differential	50.574	35.770	22.269	17.017	11.148	12.484	26.372	16.056	16.229
Structural Effect	0.191	0.341	0.426	0.516	0.512	0.551	0.469	0.583	0.473
(Std Error)	0.116	0.161	0.083	0.124	0.067	0.067	0.126	0.099	0.144
Share of Gender Differential	49.426	64.230	77.731	82.983	88.852	87.516	73.628	83.944	83.771

Table D.2: Gender Level Descriptive Statistics for Endowments in Ghana

	10th	20th	30th	40th	50th	60th	70th	80th	90th
	mean	mean	mean	mean	mean	mean	mean	mean	mean
Total Difference	0.659	0.617	0.576	0.564	0.492	0.492	0.427	0.427	0.452
(Std Error)	0.071	0.057	0.067	0.060	0.048	0.047	0.049	0.067	0.097
Composition Effect	0.201	0.183	0.171	0.181	0.143	0.160	0.137	0.134	0.137
(Std Error)	0.064	0.043	0.049	0.037	0.036	0.039	0.036	0.044	0.082
Share of Gender Differential	30.486	29.692	29.726	32.090	29.052	32.598	32.200	31.430	30.229
Structural Effect	0.458	0.434	0.405	0.383	0.349	0.331	0.289	0.293	0.316
(Std Error)	0.092	0.066	0.091	0.070	0.062	0.048	0.053	0.067	0.084
Share of Gender Differential	69.514	70.308	70.274	67.910	70.948	67.402	67.800	68.570	69.771

Table D.3: Gender Level Descriptive Statistics for Endowments in Rwanda

	10th	20th	30th	40th	50th	60th	70th	80th	90th
	mean	mean	mean	mean	mean	mean	mean	mean	mean
Total Difference	0.560	0.565	0.627	0.554	0.625	0.565	0.630	0.699	0.756
(Std Error)	0.288	0.200	0.151	0.122	0.156	0.151	0.149	0.150	0.192
Composition Effect	0.258	0.271	0.183	0.117	0.197	0.304	0.219	0.195	0.121
(Std Error)	0.180	0.115	0.120	0.096	0.114	0.131	0.094	0.083	0.082
Share of Gender Differential	46.044	48.055	29.175	21.195	31.446	53.768	34.808	27.916	15.951
Structural Effect	0.302	0.293	0.444	0.437	0.429	0.261	0.410	0.504	0.636
(Std Error)	0.348	0.218	0.188	0.128	0.143	0.166	0.151	0.152	0.217
Share of Gender Differential	53.956	51.945	70.825	78.805	68.554	46.232	65.192	72.084	84.049

Table D.4: Gender Level Descriptive Statistics for Endowments in Tanzania

	10th	20th	30th	40th	50th	60th	70th	80th	90th
	mean	mean	mean	mean	mean	mean	mean	mean	mean
Total Difference	0.730	0.782	0.682	0.736	0.712	0.631	0.697	0.603	0.611
(Std Error)	0.074	0.060	0.045	0.062	0.051	0.045	0.036	0.064	0.067
Composition Effect	0.227	0.154	0.150	0.110	0.111	0.083	0.068	0.104	0.099
(Std Error)	0.053	0.025	0.033	0.021	0.027	0.019	0.016	0.026	0.026
Share of Gender Differential	31.076	19.622	22.042	14.917	15.532	13.148	9.721	17.225	16.257
Structural Effect	0.503	0.629	0.532	0.626	0.601	0.548	0.629	0.499	0.512
(Std Error)	0.091	0.064	0.051	0.070	0.051	0.045	0.037	0.070	0.073
Share of Gender Differential	68.924	80.378	77.958	85.083	84.468	86.852	90.279	82.775	83.743

Table D.5: Gender Level Descriptive Statistics for Endowments in Uganda

	10th	20th	30th	40th	50th	60th	70th	80th	90th
	mean	mean	mean	mean	mean	mean	mean	mean	mean
Total Difference	0.123	0.293	0.419	0.426	0.438	0.310	0.256	0.210	0.435
(Std Error)	0.170	0.092	0.127	0.113	0.142	0.108	0.117	0.101	0.129
Composition Effect	-0.046	-0.054	0.052	-0.044	-0.094	-0.043	-0.008	-0.089	-0.123
(Std Error)	0.129	0.085	0.096	0.067	0.084	0.056	0.066	0.102	0.137
Share of Gender Differential	-37.535	-18.544	12.428	-10.225	-21.502	-14.014	-3.297	-42.508	-28.338
Structural Effect	0.169	0.347	0.367	0.469	0.532	0.354	0.264	0.299	0.558
(Std Error)	0.193	0.111	0.154	0.130	0.160	0.121	0.124	0.132	0.188
Share of Gender Differential	137.535	118.544	87.572	110.225	121.502	114.014	103.297	142.508	128.338