

The Economic Costs of Educational Inequality in Developing Countries

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Abstract

This paper demonstrates that education can be an effective policy instrument to mitigate economic inequality among marginalized gender and identity groups in developing countries. We characterize the disparities in economic opportunity between gender, identity (ethnic or religious), and gender-by-identity groups in relation to disparities in educational attainment. We employ a Oaxaca-Blinder decomposition to determine the extent to which these gaps are attributable to education inequality. The analysis covers 18 countries from Eastern Europe, Latin America, and Sub Saharan Africa. We show that about half of the identity group disparities are explained by gaps in education and only about 15-17 percent of the gender employment and wage gap. However, on aggregate, eliminating identity group and gender education disparities, relative to the most advantaged, yield substantial increases in the total number of salaried workers and in the total wage bill.

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1 Introduction

Education inequality, more so than economic inequality, has only recently become a central topic of discussion among government agencies, policy makers, and international non-government organizations. In 2000, UNESCO announced the Education for All (EFA) declaration where the elimination of gender inequality was included as one of its six goals for 2015. The objective of EFA was to provide for at least a basic education for all children, youth, and adults (United Nations, 1990). In addition, the United Nations (UN) enacted resolution 270 calling for the adoption of what is currently known as the Sustainable Development Goals (SDGs), the successor to the Millennium Development Goals (MDGs). The SDGs are aimed at setting forth an inter-governmental agreement to create a policy framework to promote sustainable economic, educational, and public health development. Two of the SDGs that are most relevant to this paper are goals 4 and 10: provide inclusive and equitable quality education for all, and reduce social, economic, and political inequality within and between countries (United Nations Development Programme, 2005).

The UN's SDG 10 emphasizes that not only do disparities in individual outputs exist, but that these disparities cannot be resolved without addressing the underlying discrepancies in opportunity. In this paper, we show that creating equal opportunities in educational attainment can substantially reduce pre-existing economic gaps between advantaged and disadvantaged subpopulations within an economy. Further, the developing world has made great strides in expanding access to education for its citizens over the past 50 years. Specifically, developing countries more than doubled their years of schooling from about three years in 1965 to over seven years in 2010 (Barro and Lee, 2013). However, over the past 30 years, developing countries exhibited little to no gains in lowering education and economic inequality with income and educational Gini coefficients hovering around 45 and 41, respectively.¹ Further, Omoeva and Buckner (2015) and Omoeva et al. (2016) show that educational inequalities persist over the past half century between ethnic, wealth, and gender groups. It is clear that inequalities in educational opportunities and economic well-being persist across a variety of dimensions, across the developing world.

This paper empirically tests the underlying relationship between preexisting inequalities in educational attainment across gender, ethnic/religious groups, hereafter referred to as 'identity groups', and the interaction of inequalities in economic opportunities and output among these groups. Specifically, we assign each disadvantaged group the same educational attainment distribution as that of the most advantaged group in a given country and estimate the gains in labor market participation, employment, salaried employment, and earnings. We provide evidence of substantial losses in efficiency because of unequal distribution of educational attainment between different subpopulations of any given country in our analytic sample.

¹Income Gini coefficient data are drawn Standardized World Income Inequality Database (SWIID) and education Gini coefficients are extracted from the Education Policy and Data Center's (EPDC) Education Inequality and Conflict (EIC) database.

Labor market discrepancies between males and females, as well as between identity groups, have been investigated extensively in the literature.² However, only few studies investigate the relationship between economic inequality and inequality of educational opportunity (Lam and Levison, 1991; Park, 1996; Garcia-Aracil and Winter, 2006). We improve upon the existing literature by examining the labor market response to within-group and country changes in the distribution of educational attainment. We identify the labor market response by constructing the counterfactual employment and wage outcomes for the same individuals, but under a scenario where the educational attainment distributions are identical between all subpopulations of a given country. The second contribution of this paper, is that we investigate inequalities in economic output between gender and identity groups in 18 countries from Africa, Asia, Eastern Europe, and Latin America. As such, we are able to employ a uniform methodology to evaluate education expansion among each country’s marginalized. This approach enables us to generalize the relationship between inequality in educational opportunity and inequality in economic outcomes across a range of countries at different stages of their development.

We use publicly available household survey micro-data from the World Bank Living Standards Measurement Survey (LSMS) and STEP Skills measurement study, as well as national census data through the University of Minnesota’s Integrated Public-Use Microdata Series (IPUMS) International for 18 developing countries. We employ a Oaxaca-Blinder (OB) decomposition technique to deconstruct the gaps in employment and earnings between gender and identity groups. The main purpose of the OB decomposition is to quantify the portion of the gap that is unexplained by observable differences between groups to try to provide insight into the level of discrimination that is present in the labor market (Oaxaca, 1973; Blinder, 1973). However, the purpose of this paper is to address the question ‘what is the opportunity cost of the existing educational inequality between gender and identity groups?’ We thus rely on the OB decomposition to alter the educational attainment distribution of the disadvantaged subpopulations to mimic that of the advantaged group to identify the counterfactual labor market response to a hypothetical elimination of all attainment gaps.

On average, across all countries in our sample, we find that eliminating the gender education gaps results in a 13 percent increase in the proportion of the population with salaried employment and a 30 percent increase in earned income among females. Similarly, and to a larger degree, eliminating educational inequalities between identity groups leads to a 32 percent increase in the proportion of the population who are employed in a salaried position and a 93 percent increase in earnings among individuals from disadvantaged groups. Lastly, we examine the labor market responses to changes in the educational attainment of gender-by-identity groups relative to the most educated group in each country. In this case, we find that the proportion who are in salaried employment increases by 35 percent while earnings increase by 60 percent, on average for all individuals across all disadvantaged groups.

²See Patrinos and Sakellariou (1992), Psacharopoulos and Tzannatos (1993), Tzannatos (1999), Patrinos (2000), and Hall and Patrinos (2012) for examples of studies examining gaps in earnings between gender and ethnic groups in developing countries.

After estimating the counterfactual labor market responses as a result of completely reducing between-group educational inequality, we compute the counterfactual change in economic inequalities in employment and income in each of the countries in our sample. When examining gender gaps in pay and employment opportunities, we estimate a seven-point decline in the gender salaried employment gap and an 11-point decrease in the gender pay gap as a result of achieving perfect gender education parity. Further, we estimate a 5-point decrease in the Gini coefficient based on salaried employment and an 11-point decline in the income Gini coefficient between identity groups. By using the decomposition technique to isolate for the differential effects of our predictors of interest, we identify a clear relationship between educational and economic inequalities within and between countries.

2 Relevant Literature

There exists an extensive literature on the estimation of the effects of educational attainment on labor market earnings.³ However, research on the effects of educational inequality, or the disparities in educational attainment between individuals and groups, on income inequality, or economic outcomes for that matter, is sparse. To our knowledge, Garcia-Aracil and Winter (2006) is the only paper that uses educational attainment as a policy vehicle to lower earnings disparities between ethnic groups in developing countries. The paper finds that gender gaps in earnings are not as affected by education but rather by discriminatory practices in the labor market. We build on this study by employing a similar empirical strategy to decompose wage differentials between gender, identity, and gender-by-identity groups in 18 countries with varying levels of economic development. To add to the contributions of this study, we compute the total opportunity cost of educational inequality in the form of foregone salaried employment and earnings for each economy in our sample.

In a similar analysis conducted in the United States, the White House Council of Economic Advisers (Council of Economic Advisers, 2015) identify gaps in educational attainment as a hindrance to the overall U.S. economy. The CEA report uses the same methods as in Hershbein et al. (2015) to measure the counterfactual earnings of Black or Hispanic individuals if the attainment gaps were completely closed. The paper simulates the labor market impacts of increasing college attainment for Black and Hispanic subpopulations with only a high school diploma to mimic the college attainment rates of White individuals. This leads to an increase in overall college attainment in the US, an increase in the likelihood of employment, and an increase in average earnings. More relevant to our study, The CEA find that the racial pay gap would decrease by about 40 percent and lead to an increase in annual earnings of Black or Hispanic men by about 170 billion dollars.

³For a survey of the returns to schooling literature in the United States refer to Card (1999). For a review of the international returns to schooling literature, see Cohn and Addison (1998), Psacharopoulos and Hinchliffe (1973), Psacharopoulos (1981, 1985, 1994), and Psacharopoulos and Patrinos (2004).

Lam and Levison (1991) examine trends in the variance of years of schooling from 1976 to 1985 in relation to the variance in earnings over the same time period in Brazil. In a simple theoretical model, the authors posit, using variance in education and earnings to indicate inequality, that income and educational inequality are directly proportional to each other. The theoretical model demonstrates that if the variance of schooling were to decrease, then the variance in log earnings would be lower as a result. However, the effects estimated in this paper are identified by comparing differences in educational inequality between different Brazilian age-cohorts in relation to differences in economic inequalities. As a result, Lam and Levison (1991) are not able to isolate the effects of educational inequality on economic inequality from systematic observable differences and changes in the labor market dynamic between the different cohorts.

Park (1996) analyzes a cross-sectional dataset of 59 countries to estimate the relationship between overall educational inequalities, measured using the coefficient of variation, and income inequality, which is measured using the Gini coefficient. The paper estimates a positive association between inequality in education and income. This paper is the first study to provide quantitative evidence that educational and income inequalities are correlated across a large sample of developing countries. Nevertheless, the evidence presented in this study are based on between-country differences in educational inequality in relation to differences in the income Gini coefficient. It is therefore difficult to infer that these results would hold if educational inequalities were to change within a given country.

Lastly, we note that disparities in economic output are not fully explained by disparities in education alone, but rather explained by differences in certain observable attributes including education, marital status, fertility, and geographic location, as well as disparities arising from a combination of unobservable factors and discrimination in the labor market.⁴ The empirical literature has expanded from the seminal works of Oaxaca (1973) and Blinder (1973) in quantifying the extent to which disparities in pay between persons from different gender or racial groups are unexplained by differences in their observable traits.

Several papers have used the Oaxaca-Blinder decomposition to investigate discrimination in earnings between groups in developing countries, especially in Latin America. Psacharopoulos and Tzannatos (1993) examine wage differentials between men and women in 15 Latin American and Caribbean (LAC) countries. On average across the region, the authors find that the percentage of the pay advantage for males that is due to discrimination varies between 86 and 97 percent. Patrinos (2000) and MacIsaac and Patrinos (1995) sheds light on potential discrimination in Bolivia, Brazil, Guatemala, Mexico, Paraguay, and Peru. The research conducted by Patrinos (2000) shows clear patterns of discrimination against ethnic groups with higher levels of poverty and lower levels of education, than the most affluent ethnic group.⁵ Across all countries,

⁴For the purposes of this paper, we will refer to the parameter difference portion of the Oaxaca-Blinder decomposition as the ‘discrimination’ effect since this particular parameter is of secondary importance to our argument.

⁵Ethnic groups in Bolivia, Guatemala, Mexico, and Peru are identified as Indigenous or Non-Indigenous. Groups in Paraguay are determined based on main spoken language. Groups in Brazil are based on race.

Patrinos estimates that discrimination accounts for between 12 percent and 52 percent of the total ethnic wage gap. These studies provide substantial insight in to the labor market dynamic in LAC countries.

We add to the existing literature by using newer data over a broader set of countries and provide a focused policy discussion to bridge gender and identity group economic gaps in education. Psacharopoulos and Tzannatos (1993) state that the elimination of gender inequalities in employment would result in substantial gains, although these should be considered upper-bound estimates, as it assumes that women and men are perfect substitutes and that women and men are equally willing to work in the different professions that they are currently employed. MacIsaac and Patrinos (1995) further expand on the index-number problem, identifying it as the non-discriminatory wage structure (b^*), which is unobserved. Their results include estimates for four different types of unobserved wage structures, including a pooled estimate that uses OLS regression, which results in an estimate that tends to be closer to the majority wage structure relative to the minority. Lastly, our paper provides the added benefit of estimating the labor market response of equalizing education opportunities in a number of countries that are at different stages of their development to assess whether this relationship is generalizable or sensitive to the local context.

3 Data

3.1 Regional Context

While previous research on education and employment discrimination tends to focus on single countries or Latin America, the present paper chooses to look at a larger pool of countries and a greater geographic scope. The advantage to studying this set of countries is that we can generalize across a broader range of country characteristics and stages of economic development. Countries in Sub Saharan Africa tend to have higher rates of poverty and are among the most unequal in terms of education, income and employment outcomes in the world. While 6 of these countries were among the 50 fastest growing economies in 2014, they possess a large percentage of the population living in poverty. The World Bank estimates that in 2011, the extreme poverty rate, measured as the percentage of the population living on 1.25 PPP dollars or less, was 46.8 percent across the region (Cruz et al., 2015). This is almost twice as high as the next closest region, South Asia. Asian countries such as Timor-Leste and Tajikistan, and the lone Middle Eastern country in our sample (Iraq), also have high rates of poverty, corruption and are highly unequal.

Although Latin American countries are wealthier and have lower rates of absolute poverty than the Sub Saharan African and Asian countries in our sample, they tend to have extremely high rates of inequality. Colombia (9th highest Gini index of income inequality in the world), Mexico (20), and Bolivia (21) have income inequality that is on par with South Africa (1), Kenya (18),

and Malawi (27) in Sub Saharan Africa. European, Middle Eastern and Asian countries in our sample have lower rates of income inequality, but are high relative to rich countries. Inequalities in educational outcomes are also high among these countries. The percentage of girls in lower secondary education enrollments is one indicator of gender equality that is captured cross-nationally. All but five of the countries in our sample are in the bottom half of countries in terms of girls' access to education. These disparities often translate to the labor market. For example, a 2016 report from the World Bank highlights Sub Saharan Africa as one of the most restrictive regions in the world in terms of female employment opportunities, relative to male (World Bank 2015). The 18 countries in our sample are low and middle income countries representing a diverse range of economic and social characteristics, and together serve to illustrate the consequences of policy decisions to reduce inequality.

3.2 Data Sources

We draw on micro-level data from three nationally representative household based surveys or censuses, as conducted by the country's national statistics agency or in conjunction with the World Bank. The first is the World Bank's Living Standards Measurement Survey (LSMS) which covers household survey data for 13 countries, the World Bank's STEP Skills Measurement Surveys covering another seven countries, and micro-level census data from the Integrated Public Use Microdata Series, International (IPUMS-I) housed by the Minnesota Population Center. The final analytic samples are selected on the basis of the data being current and on the availability of household survey modules on education, labor force activity, wage income, gender, and identity group indicators. Table 1 details the country, year, and source of the household survey along with the level of possible stratification by gender or identity group. We note that the education, labor force activity, wage income, and gender are considered necessary for the purposes of this study, while ethnicity or religion is considered sufficient. Note that the analytic samples themselves are nationally representative, with the exception of the STEP skills measurement surveys that are representative of the urban subpopulations only.

[INSERT TABLE 1 HERE]

One of the main drawbacks to extracting microdata from different sources of household surveys, at least for this study, is that the sample sizes vary greatly by source. Census data have much larger samples than LSMS or STEP data. It is likely that estimates from the LSMS and STEP surveys will be measured with a lower level of precision. The second drawback to using these data stems from differences in the measurement of educational attainment, even after harmonization of the educational measures. We argue that the purpose of this paper is not to draw upon comparisons between countries, but to simulate a change in the educational attainment of disadvantaged groups from within a given country system, and estimate the impacts of the change on specific groups' labor market outcomes. As a result, all of the analyses presented in this study are stratified at the country level.

The data contain basic individual and household demographic characteristics, such as gender, identity group, age, status within the household, marital status, number of children, and location indicators (urban/rural). More central to our analysis, we include individuals' level of educational attainment defined as the level of education completed.⁶ Lastly, we include the following labor force measures as outcomes of interest, labor force participation status, employment status, salaried employment status, and monthly wages.⁷

3.3 Sample Summary

Tables 2, 3, and 4 present the overall distributions for demographics, educational attainment, and labor market outcomes for the person-level samples from each of the countries included in the study, respectively. We restrict the analytic samples from each country to all individuals between the ages of 25 and 60 years. This restriction maximizes the common support across all countries for the working age sample where schooling and retirement decisions are less relevant. This restriction supports our strategy to simulate changes in the labor supply of disadvantaged subpopulations within an economy and observe the resulting changes in labor force participation, (salaried) employment, and wages.

To that end we compile typical elements of the Mincer earnings function including schooling, experience, and net monthly earnings.⁸ Additionally, we are interested in not only decomposing wage differentials, but also differences in labor force participation, employment, and salaried employment. We augment the typical Mincer equation by including controls for individuals' relative position within the household, marital status, number of children 15 years old or younger, and an indicator for urban or rural locations.

Table 2 presents the summary statistics for the analytic sample, by country. For the purposes of this paper, we require at least one of a gender, ethnic, religious indicators to estimate employment and wage differentials between groups. All data sources include gender indicators and we are able to assess gender parity in 18 developing countries. However, there are five countries with no ethnic or religious information collected in their household surveys. We note that even in countries that collect ethnicity or religion indicators, there are a number of groups that would be too small to viably estimate a Mincer equation for. We group all ethnic or religious subgroups that make up less than five percent of the total population into a composite 'other' category. This results in certain countries being divided into as little as two identity groups or as many as eight groups.⁹

⁶We follow definitions used in the IPUMS data where education attainment is defined as: completed less than primary school, completed primary school, completed secondary school, and completed postsecondary school.

⁷Monthly wages are measured net of income taxes and converted to 2010 PPP dollars.

⁸For the originating work, refer to Mincer (1974). For a more recent survey of the literature and discussion of the Mincer earnings function and rates of return to schooling, see Heckman et al. (2003, 2006) and Lemieux (2006).

⁹Refer to Figures A.1a, A.1b, and A.1c in the Appendix for exact proportional ethnic or religious breakdowns,

[INSERT TABLE 2 HERE]

In terms of the sample size in each country, we observe a sizable variance between the sampled countries. Unsurprisingly, samples from national Censuses yield the largest samples; e.g. Brazil, Mexico, and Panama have sample sizes of 311,590, 237,682, and 149,902 observations of working-age individuals, respectively. Although the samples differ substantially in size, the smallest country samples include at least 3,785 adults (Tajikistan) between the ages of 25 and 60 years. Data from the STEP skills measurement survey oversample females in urban locations.¹⁰ For instance, 72.6 percent of the Armenian sample is female and 71.7 percent of the sample from Georgia is female. Additionally, STEP survey data are restricted only to urban locations, which limits the external validity of the findings based on the STEP surveys. However, in most of the STEP survey countries, the urban population is still a substantial and major proportion of the total population. This would still make the findings of this paper relevant for these countries, especially at a policy level. Lastly, Table 1 presents the percentage of the population who are household heads and those who are married, as well as the mean number of children under 15 years and the mean age of the sample.

Table 3 displays the educational attainment distribution per country by tabulating the percentage of all working age individuals who have not completed their primary education, completed only a primary education, completed only a secondary education, and completed postsecondary education. Primary, secondary, and postsecondary education are determined using country-specific education standards.¹¹ Although the educational attainment measures may not be directly comparable between countries, secondary and tertiary completion are largely obtained after a similar number of years of schooling. To that end, we find that a majority of the African countries have a postsecondary education completion rate that is lower than five percent. Conversely, Albania, Armenia, and Georgia are countries that have less than 1.7 percent of their working age population who have not completed at least a primary education. The education attainment distribution provides some insight into the comparability between countries, especially with respect to the estimation of the returns to different levels of schooling.

[INSERT TABLE 3 HERE]

Table 4 presents the labor force participation rates, the employment-to-population rates, salaried employment-to-population rates, and monthly net wages (converted to PPP dollars), by country. Interestingly, we observe that African countries exhibit the highest labor force participation rate relative to all other geographic regions in our sample, where the lowest labor force participation rates in Ethiopia and South Africa are about 73 percent.¹² Conversely, only Bulgaria and

by country.

¹⁰Please refer to the “STEP skills measurement surveys: Innovative tools for assessing skills” World Bank Discussion paper for more information on the sample and instrument design.

¹¹We rely on the International Standard Classification of Education (ISCED) as published by the UNESCO Institute of Statistics (UIS) to determine education completion levels in each country.

¹²This is mostly due to differences in the nature of economic activity between the different regions. Sub Saharan

Serbia, out of the seven European countries, have a labor force participation rate higher than 73 percent. We also observe relatively high employment-to-population rates in African countries. However, when examining salaried employment, we observe a sizable decline in the percentage of the population who are salaried workers among Africa countries, less so in all other regions. Lastly, we compute the mean monthly wage, net of income taxes and converted to PPP dollars, for each country. We present the mean earnings inclusive of all working age individuals with and without salaried employment, i.e. individuals with no wage data are coded as having zero wage.

[INSERT TABLE 4 HERE]

4 Empirical Methods

4.1 Oaxaca-Blinder Decomposition

The purpose of this paper is to estimate the opportunity costs to a developing economy of maintaining substantial gaps in educational attainment between gender and identity groups. We construct a counterfactual labor market decision making process under alternative educational attainment distributions between groups using the Oaxaca-Blinder decomposition technique (Oaxaca, 1973; Blinder, 1973). Specifically, we decompose differentials in labor force participation, employment, salaried employment, and net monthly wages between gender groups and identity groups.¹³ The rationale behind including other non-wage labor outcomes is because education attainment has been shown in the literature to affect individual labor force participation, employment, as well as type of employment decisions.

The Oaxaca-Blinder technique decomposes the overall differences in labor market outcomes into explained and unexplained differentials. The explained portion of the differences are those due to differences in the observed characteristics between the groups, while the unobserved portion is normally attributed to possible discrimination practices by employers (Weichselbaumer and Winter-Ebmer, 2005). As such, we estimate separate labor supply and Mincer wage equations for each group, in each country, as follows:

$$Y_j^k = ED_j^k\alpha + X_j^k\beta + \epsilon_j^k \quad (1)$$

where; $k=1,2,\dots,K$ represents each country in the sample and $j=1,2,\dots,J$ represents group iden-

countries tend to report a relatively high labor force participation because of a high rate of participation in unpaid agricultural work, which is not as prevalent in other regions.

¹³Because the decomposition technique requires only two groups to be compared at a time, we iterate through all pairwise combinations comparing the most educated ethnic/religious group in a given country with every other ethnic/religious group; the same goes for the gender-by-ethnic/religious group analysis.

tifiers for gender and ethnicity/religion identity group affiliation, or interaction groups with J being the total number of groups in each country. Y_j^k is the outcome variable denoting indicator variables for labor force participation, employment, salaried employment, and a continuous variable for monthly net wages for individual i belonging to group j in country k . ED is a matrix containing indicator variables for the highest level of education completed, primary, secondary, and postsecondary.¹⁴ Note that α is a vector of coefficient parameters associated with each variable in the ED matrix, representing the labor market returns to schooling relative to attaining an education level, less than primary. X is a matrix composed of control variables for geographic location (urban/rural), indicator for household head, marital status, number of children, and age. ϵ represents the idiosyncratic error term.

This means that equation (1) simply estimates the reduced form of the relationship between education and various labor market outputs and α represents the net effects of education.

In the second stage, we compute the Oaxaca-Blinder decomposition as follows:

$$\bar{Y}_A - \bar{Y}_B = (\overline{ED}_A - \overline{ED}_B)\alpha_B + (\bar{X}_A - \bar{X}_B)\beta_B + \overline{ED}_A(\alpha_A - \alpha_B) + \bar{X}_A(\beta_A - \beta_B) \quad (2)$$

for simplicity, let

$$D = \bar{Y}_A - \bar{Y}_B; \quad (3a)$$

$$\Delta\overline{ED} = \overline{ED}_A - \overline{ED}_B; \quad (3b)$$

$$\Delta\bar{X} = \bar{X}_A - \bar{X}_B; \quad (3c)$$

$$\Delta\alpha = \alpha_A - \alpha_B; \text{ and } \Delta\beta = \beta_A - \beta_B \quad (3d)$$

therefore, equation (2) reduces to

$$D = (\Delta\overline{ED}\alpha_B + \Delta\bar{X}\beta_B) + (\overline{ED}_A\Delta\alpha + \bar{X}_A\Delta\beta) \quad (4a)$$

$$D = E + U \quad (4b)$$

Group A denotes the gender or identity group that is the most educated in a given country, and group B denotes the comparison group (less educated). \overline{ED}_A , \overline{ED}_B , \bar{X}_A , and \bar{X}_B are matrices containing the means of the educational attainment and demographic characteristics of groups A and B, respectively. α and β are vector of coefficient parameters as a result of estimating equation [1] for groups A and B. Therefore, the term $\Delta\overline{ED}\alpha_B + \Delta\bar{X}\beta_B$ (denoted as E) represents the explained differences in the labor market outcomes that are due to differences in the two groups' educational attainment and demographic characteristics. The term $\overline{ED}_A\Delta\alpha + \bar{X}_A\Delta\beta$ (denoted as U) represents the unexplained differences, where a portion of the labor market differentials are driven by unobserved factors manifested in the different slope parameters for

¹⁴Highest level of education completed, less than primary, is the reference category.

both groups.

The choice of the reference group in the Oaxaca-Blinder decomposition is important and can alter the results of the decomposition. Neumark (1988) argues that choosing one group over another as the reference group would produce two different sets of results. For instance, when examining gender differences in the labor market, selecting males as the reference group would measure what Neumark identifies as the effect of nepotism, i.e. employers value hiring males over females and are thus overpaid. Conversely, if females were chosen as the reference group, then the estimated effects would be identified as discriminatory and would then be underpaid. The reality of the labor market may lie between the two effects. The ideal model specification, would therefore be the one that would prevail under a state of the world with no discrimination (Lee, 2015), i.e. all subpopulations are observe the same returns to their schooling.

We approximate the counterfactual rate of return to education by estimating equation (1) using a pooled sample, separately for each country. By introducing the pooled parameters, α^* and β^* , Neumark (1988) and Oaxaca and Ransom (1994) show that equation (4) can be rewritten as:

$$D = \Delta \overline{ED}\alpha^* + \Delta \overline{X}\beta^* + [\overline{ED}_B(\alpha_B - \alpha^*) - \overline{ED}_A(\alpha_A - \alpha^*) + \overline{X}_B(\beta_B - \beta^*) - \overline{X}_A(\beta_A - \beta^*)] \quad (5)$$

where,

$$\alpha^* = \Omega\alpha_A + (I - \Omega)\alpha_B, \beta^* = \Omega\beta_A + (I - \Omega)\beta_B \quad (6a)$$

$$\text{and } \Omega = (X'_A X_A + X'_B X_B)^{-1} X'_A X_A \quad (6b)$$

In this case, the term $(\Delta \overline{ED}\alpha^* + \Delta \overline{X}\beta^*)$ denotes the differences in labor market outcomes due to the differences in observed attributes of the two groups and the remainder denotes the unexplained portion of the differential. However, from an education policy perspective, we are interested only in expanding education to the relatively disadvantaged groups. As such, we are only interested in the portion of the explained differential due to differences in education. $\Delta \overline{ED}\alpha^*$ is the parameter of interest in this study, which represents the counterfactual change in the disadvantaged group's labor market outcomes in response to eliminating the education gap. In this simulation, we eliminate any education inequality by expanding educational attainment for each disadvantaged group up to the advantaged group's level.

In the final stage of the analysis, we compute the aggregated costs to each economy from persistent educational inequalities between groups by aggregating the changes in labor market outputs over the relevant population in each country. As a result, we estimate the total number of additional active labor force participants, employed workers, and salaried workers in each country had there been no education attainment gaps between groups. Lastly, we aggregate the net wage differentials across the relevant group populations to compute the total amount of foregone wages from the existing educational gaps.

4.2 Selection Correction

Selection bias is a typical problem that arises in empirical labor supply estimation. To circumvent this issue, we estimate equation (1) while including all individuals from each group of interest in the regression sample, regardless of their labor market status. In essence, we differentiate between the decision to participate in the labor force or not, participate in employment or not, and whether they receive a salary or not. In terms of wages, we assume that individuals without salaried employment earn a zero amount.

Using the Heckman selection correction technique may be misspecified in our particular context. The selection correction model requires an explanatory variable that satisfies the exclusion restriction of affecting the extensive margins of labor supply but not the intensive margins; otherwise, the selection model does not result in consistent estimates (Heckman, 1979). Because we are examining labor market mechanics across 18 countries, such an instrument is not readily available. Additionally, rather than estimating the full structural equation, where we would need to sequentially model the decision to enter the labor force, receive employment, receive salaried employment, and lastly the Mincer earnings function, we estimate the reduced form relationship between $[ED, X]$ and each of the outcome variables. As a result, the estimate from equation (1) yields the net returns to education on labor market outcomes.

5 Results

This section presents the results of the Oaxaca-Blinder (OB) decomposition applied to gender, identity, and gender-by-identity employment and wage differentials in 18 developing countries. First, we decompose differences in employment, salaried employment, and wages into differences due to observed characteristics, or endowments, which are further disaggregated into differences due to education (inequality) and demographics, separately. We also compute the differences that are due to unobserved factors which we will refer to as the ‘discrimination’ effect. Second, we conduct a post-OB decomposition analysis where we compute the counterfactual change in employment and wage inequality prior-to and following a hypothetical elimination of inequality in education attainment. Lastly, we use the results of the OB decomposition to calculate the opportunity cost to each economy of sustaining pre-existing levels of inequality in education in terms of foregone salaried employment levels and foregone annual wages.

5.1 Gender

Tables 5 and 6 present the results of the OB decomposition on the likelihood of salaried employment and annual wages, sorted by the percentage of the total difference between females and males that is attributed to inequality in education. The tables display the salaried employment rate and mean monthly wage (\bar{Y}_F) among females, the mean difference (D) between females and

males, the differences in the outcomes that are due to unobserved factors (U), and the differences in the outcomes that are due to education ($\Delta\bar{E}\bar{D}\alpha^*$) and demographics ($\Delta\bar{X}\beta^*$). Lastly, we calculate the aggregate number of foregone salaried female workers and foregone annual wages for each country as the loss to the economy as a result of prevalent attainment gender gaps. Alternatively, these estimates can be viewed as the benefit to the economy from eliminating gender attainment gaps.

5.1.1 Salaried Employment

Table 5 shows that Ghana would benefit the most from eliminating the education disparity between males and females where the salaried employment rate for females would increase by 9 percentage points. Furthermore, another nine countries exhibit substantial gains in salaried employment between 3.1 percentage points and 5.7 percentage points, while 11 countries exhibit little to no gains as a result of eliminating education inequality. Note that one of the countries, Georgia, exhibits negative gains from eliminating inequalities in education between males and females. This is due primarily to the fact that the education gap between males and females is less than one percent. As such, the ‘discrimination’ and demographic effects make up the totality of the gap in salaried employment.

[INSERT TABLE 5 HERE]

To put the magnitude of the findings into perspective, we plot the percent of the total salaried employment gap that is attributed to education in Figure 1. The remainder of the total gap is attributed to demographics and unobserved factors. Nigeria shows the largest such percentage, that it would be able to bridge 41.5 percent of the employment gap by completely reducing the education gap between genders. The same 10 countries that exhibit substantial gains in salaried employment would narrow the gender employment gap by between 9.3 percent and 31.4 percent, while those countries that exhibit modest gains in levels would also modestly narrow the gap by between 0.9 percent and 8.6 percent.

[INSERT FIGURE 1 HERE]

The last column of Table 5 calculates the opportunity cost to each economy in terms of the number of foregone salaried female workers because of prevalent gender education gaps. These results show that if countries like Nigeria were able to completely bridge the attainment gap between genders, we predict an additional 1.5 million women would be employed in a salaried occupation who otherwise would have been unemployed or inactive in the labor market. Ethiopia and Ghana are examples of Sub-Saharan countries that would experience an increase in the number women in salaried employment by about half a million women.¹⁵ In South Africa, where we estimate a minimal effect of diminishing gender attainment gaps, we still estimate

¹⁵The foregone number of women in salaried employment are calculated as the percentage point gain in salaried employment among women multiplied by the total number of adult women in each country.

that salaried employment would increase by 36,018 women.

5.1.2 Wages

We present the OB decomposition of the gender wage gap in Table 6. We find that women in Iraq and Bolivia would experience the largest increase in monthly wages if gender parity in education were achieved. Moreover, we estimate that women would, on average, experience an increase in their monthly wages by between 905 and 1,026 Dollars (PPP), which correspond to an 81 percent and 44 percent increase in female wages, respectively. All other countries, except for Georgia, exhibit variation in the gains made from closing the gender attainment gap in terms of monthly wages, ranging from 16 Dollars to 799 Dollars. Relative to mean female wages, we observe quite large variances in the percentage gains that range between 1.3 percent and 123 percent. In certain countries, this is representative of extremely low female wages. For instance, average monthly wages for women in Malawi is 205 PPP Dollars and an increase in their attainment to match that of their male counterparts increases their monthly wage by 206 PPP Dollars. However, even doubling women’s wages in Malawi only reduces the gender pay gap by 36 percent.

Further, we argue that it is difficult to compare the gains across countries because of differences in the cost of living in each country. Figure 2 plots the proportions of the gender wage gap that are attributed to education inequality, demographics, and unobserved factors. In this case, our estimates show that 11 countries exhibit at least a 13 percent reduction in the gender pay gap as a result of eliminating the gender education gap. Most notably, Ghana shows the largest such gains with a 42.4 percent reduction in the gender pay gap through education, whereas Armenia and Albania exhibit just under a 1 percent reduction in the pay gap.

[INSERT TABLE 6 HERE]

Figure 2 plots the proportion of the total gap decomposed into three components that are differences in education, demographics, and unobserved factors (or unexplained). Similar to Figure 1, we see that the majority of the gender pay gap is attributable to factors beyond the control of the disadvantaged group. However, we find substantial variation in the composition of the gap explained by demographic and unobserved factors. For instance, almost two thirds of the gender pay gap in Nigeria is attributable to unobserved/unexplained differences between females and males.

[INSERT FIGURE 2 HERE]

5.1.3 Education Inequality and Employment Inequality

We complement the OB decomposition results with a ‘back of the envelope’ simulation exercise where we compute the changes in employment and wage inequality in response to closing the

gender attainment gap. Specifically, we use the OB decomposition to construct counterfactual labor market outcomes for females when having the males' education distribution. Once we estimate the counterfactual outcomes, we calculate the counterfactual gender gaps in employment and wages. The results of the simulation for salaried employment and wages are presented in Table 7. All gender gaps in the following analyses are calculated as the ratio of the mean value for females to that of males.

Overall, we find significant gains in reducing both the employment and wage gender gaps in response to closing the attainment gaps between gender groups. Ten countries display at least an 8 percent reduction in the salaried employment gap between genders, two of which, Ghana and Timor-Leste, experience a 21 percent reduction in the gap. The impacts of reducing education gaps are more prominent on wages. We show that 12 countries would reduce the gender pay gap by at least 9.6 percent, five of which would reduce their gender pay gap by at least 21 percent and by as much as 31.5 percent (Ghana).

[INSERT TABLE 7 HERE]

In Figures 3 and 4, we show that the variance in the size of the gains in gender employment and wage gaps can be explained by the initial size of the gender attainment gap in each country. This finding provides additional evidence regarding the direct relationship between inequalities in education and inequalities in labor market outcomes. We argue that even though certain gains were relatively small due to the high level of attainment parity between genders, this exercise shows that if the disparities between genders were larger, so would the disparities in their labor market outcomes. From the figures, we observe a strong and positive linear relationship between changes in the education gap and changes in the labor market gap between genders. Although, we provide this evidence for only 18 countries, we compute simple correlation coefficients of about 0.93 for both labor market outcomes.

[INSERT FIGURES 3 and 4 HERE]

5.2 Identity Group

Similar to gender, we present the results of the OB decomposition as the difference between two groups; in the case of ethnicity and religionidentity groups, it is the difference between the most advantaged group in terms of educational attainment and that of all other groups combined. As before, the tables show the mean employment level and wages (\bar{Y}_D) of the country's disadvantaged group(s), the mean difference (D) between the advantaged and disadvantaged groups, the portion of the difference that is due to unexplained factors (U), the portion that is explained by education inequality ($\Delta\bar{E}D\alpha^*$), and the part explained by demographic characteristics ($\Delta\bar{X}\beta^*$).

5.2.1 Salaried Employment

Table 8 presents results of the OB decomposition for salaried employment. The sixth column ($\Delta\overline{ED}\alpha^*$) shows the difference in salaried employment due to education. As can be seen, countries such as Timor-Leste, Nigeria, and South Africa have a greater percentage of their gap explained by education, relative to the demographics and unexplained components. For example, Timor-Leste would experience a 10 percentage point increase in its salaried employment rate by bridging the education inequality between the Tetum ethnic group and the rest of the country, which accounts for half of the total difference. Another eight countries would experience 3 to 8 percentage point increases in their salaried employment rate because of closing any and all gaps in education between identity groups.

[INSERT TABLE 8 HERE]

However, as a percentage of the total gap, seven countries would experience more than a 50 percent reduction in the total gap by closing the identity group education gap, with Ghana and Mexico covering 101 percent and 141 percent of the total gap through equalizing education between identity groups (Figure 5). At the low end, three East African countries (Ethiopia, Kenya and Uganda) show relatively modest gains in salaried employment of about 1 to 3 percentage points. Still, reducing education inequality completely in these countries would reduce the salaried employment gap by up to 43 percent. Relative to gender, the portion of the gap between identity groups that is explained by gaps in education is much higher. It is likely that this phenomenon is due to gender discrimination being more prominent in these countries than identity group discrimination. As such, education can be seen as a more effective tool to bridge employment gaps between identity groups.

[INSERT FIGURE 5 HERE]

The last column shows the estimated increase in the number of salaried workers that would result from an elimination of identity group gaps in educational attainment. Nigeria, as the most populous country in Sub Saharan Africa, would see the largest gain in salaried employment at an estimated 2.3 million additional salaried jobs, if education inequalities between Christians and non-Christians were eliminated. Other countries would also see large gains including South Africa (1.3 million) and Ghana (516,000). Even countries that would see relatively small percentage increases in the labor force would see large numbers of overall workers enter the productive labor force, such as Mexico (219,000), Uganda (205,000) and Ethiopia (161,000).

5.2.2 Wages

Table 9 shows the difference in annual wages (measured in PPP Dollars) accounted for by education inequality, differences in demographic characteristics, and unexplained factors between the most advantaged identity group and the rest of the country. South Africa, by a wide margin, has the largest difference in wages, with over five times the economic gap explained

by educational disparities between Whites and the rest of the country, compared to the next highest country (5,768 PPP dollars compared to 1,132 PPP dollars). Other countries would also see large gains, including Mexico (1,132 PPP dollars), Bolivia (765 PPP dollars), Serbia (685 PPP dollars), and Albania (662 PPP dollars) per salaried worker, annually.

[INSERT TABLE 9 HERE]

Figure 6 shows the corresponding percentages related to the total gap in annual wages (PPP dollars) as explained by education, observed characteristics, and unexplained factors. Across all countries included in our analysis, closing all education gaps between identity groups would narrow the wage gap by at least 26 percent (Kenya) up to 66 percent (Serbia). Although, we observe a gap reversal in Georgia where 184 percent of the existing wage gap would be closed if education inequalities were eliminated between those identified ethnically as Georgian and all others. However, it is important to note that the original wage gap between Georgians and non-Georgians is 188 PPP dollars annually per worker. As such, the percentage term may be misleading in terms of the magnitude of the effect of education inequality.

[INSERT FIGURE 6 HERE]

The last column of Table 9 represents the cost to the economy in terms of foregone annual wages, of maintaining education inequalities. South Africa again has the highest cost associated with maintaining education inequalities between identity groups. We calculate a 116 billion PPP Dollar opportunity cost to the South African labor market in terms of foregone annual wages. Four of the next five countries with highest costs are in Sub-Saharan Africa, where the costs associated with maintaining the education advantage for groups in Nigeria (Christians), Ghana (the Ga-Adangme ethnic group), Kenya (Swahili speakers), and Uganda (the Baganda ethnic group) amount to 15.6 billion, 4.6 billion, 1.5 billion, and 1.1 billion PPP dollars in foregone annual wages, respectively. Mexico is another country that would experience a substantial gain to the economy if education attainment gaps were closed between indigenous and non-indigenous groups, by about 8.4 billion PPP dollars annually.

5.2.3 Education Inequality and Employment Inequality

Finally, we present the results of our simulation of counterfactual labor market conditions that would result from the elimination of educational attainment gaps between identity groups in Table 10. The elimination of education disparities would result in a roughly 0.15-point reduction (out of 1) in salaried employment gaps as measured using the group Gini coefficient in four countries; Ghana (-0.13), Timor-Leste (-0.16), Ethiopia (-0.16), and Malawi (-0.15). At the same time, the elimination of education gaps would not significantly reduce employment differences between identity groups for several countries. In six out of the 13 countries for example, the group Gini coefficient would only be reduced by about 0.007 to 0.024 points (out of 1).

The reduction in wage inequality from an elimination of education inequality would be higher

than for salaried employment. Only in Georgia would the difference be negligible, while in 12 of the 13 countries the change in the wage group Gini coefficient would range from -0.04 points to -0.25 points. Across all countries, however, eliminating education inequality between identity groups would lower wage inequality by between 25 percent and 77 percent, as measured by the group Gini coefficient. In Malawi, the elimination of education inequalities would result in a 0.25-point reduction in the between-identity group wage Gini coefficient from 0.398, which is a 63 percent reduction. In Ethiopia, Timor-Leste and Ghana, the reduction would be 0.177, 0.173, and 0.152 points, relative to baseline Gini coefficients of 0.230, 0.253, and 0.247 points, which translate to a 61 to 77 percent decrease in wage inequality between identity groups.

[INSERT TABLE 10 HERE]

Figures 6a and 6b show the relationship between the hypothetical change in the between-identity group education Gini and the Gini coefficient for salaried employment and wages, respectively. The Gini coefficient is a measure of inequality that accounts for all individual differences between groups in a variable, and as it approaches 1 it indicates greater levels of inequality. The between-group Gini coefficient measures the inequality between groups rather than between individuals. As can be seen with salaried employment (Figure 7), the relationship between the counterfactual elimination of education inequalities and the corresponding decrease in employment inequality is roughly linear and positively sloped. The scatter plot shows that larger changes in education inequality lead to larger changes in employment inequality.

The relationship between the reduction in education and wage inequality also follows a roughly linear trend (Figure 8). However, the slope of the relationship between education inequality and wage inequality appears to be relatively steeper, showing that reducing education gaps between identity groups can have substantial effects in lowering wage gaps between the same groups. The Pearson correlation coefficient associated with the bivariate relationship between education and employment inequality is about 0.67, whereas the correlation coefficient between education and wage inequality is 0.80.

[INSERT FIGURES 7 and 8 HERE]

5.3 Gender-by-Identity Group

The final decomposition that we present is that of the gender-by-identity group interaction. In this case we take the identity groups presented previously and disaggregate by gender, and identify the most advantaged group this way. This results in the most advantaged group being identified as a particular gender from a specified identity group, and the education inequality is the difference in their educational attainment compared to all other groups in the country. Overlapping inequalities, such as by gender and identity group, have shown to be especially salient in some countries, and the costs associated with maintaining them are calculated here.

5.3.1 Salaried Employment

Table 11 shows the results from the OB decomposition of salaried employment between the most advantaged gender-by-identity group and the rest of the country. The table follows the same structure as Table 8, which shows the same decomposition for identity groups only. Ghana, Timor-Leste, Nigeria and South Africa are the countries that exhibit the largest gains in salaried employment in response to completely closing the education gaps between gender-by-identity groups, with between 6.1 and 12.1 percentage point increases in the salaried employment rate, nationally. In each of these countries, males are the dominant group within the dominant identity group. Another seven countries exhibit gains between 1.9 and 5.8 percentage points in the salaried employment rate, whereas two countries, Georgia and Mexico would exhibit minimal gains.

[INSERT TABLE 11 HERE]

Again, for ease of interpretation we present the different components of the OB decomposition as a percentage of the total difference salaried employment in Figure 9. In this case, the results of the OB decomposition show that for 11 of the 13 countries in the analytic sample, the employment gap decreases by at least 12 percent as a result of eliminating education inequality between groups. Most notably, we see that the gap in Ethiopia would decrease by about 63 percent and by 41 percent in Ghana. In Uganda, we observe a 257 percent reduction in the salaried employment gap in response to an education expansion that eliminates all preexisting gaps between gender-by-identity groups. Uganda is a unique country in that its most educated group (Baganda) do not have the highest employment rates, but at the same time, the vast majority of the country (approximately 89 percent) has an education attainment level completing at most a primary education.

[INSERT FIGURE 9 HERE]

The last column of Table 11 shows the cost to the economy in terms of foregone salaried workers, of maintaining education inequalities. Similar to the identity group analysis, Nigeria and South Africa have the greatest costs to their economy in terms of overall number of workers lost to education inequality by about 3.09 and 1.25 million foregone salaried workers, respectively. Other Sub-Saharan African countries, as well as Mexico, have a high cost of maintaining education inequalities. Estimates in terms of foregone workers range from 253,000 in Mexico to 877,000 in Ghana. These findings confirm that gender and identity group membership matter in tandem especially in cases where both groups are marginalized on their own rights.

5.3.2 Wages

Table 12 shows that the wage difference explained by education is over 5 times higher in South Africa, compared to the next highest country (Ghana). In South Africa, the per-person wages accounted for by education inequality equals 5,794 PPP dollars, while in Ghana (the next

highest) it is 948 PPP dollars. In both of these countries, the advantaged groups are male within their respective identity group. On the other hand, the difference in per worker annual wage accounted for by education is less than 500 PPP dollars in Timor-Leste (487 PPP dollars), Malawi (277 PPP dollars), Serbia (260 PPP dollars), Uganda (251 PPP dollars), and Ethiopia (116 PPP dollars). Georgia exhibits a negative effect of education since females are just as or more educated than males as well as the education gaps between identity groups are not significant either.

[INSERT TABLE 12 HERE]

Although the dollar amounts are converted to PPP dollars for comparability, it is still not an ideal measure of comparable cost of living across countries. To translate the effect sizes, Figure 10 presents the proportion of overall wage gaps explained by education, demographics, and unobservables. Again Uganda shows the greatest reduction in wage inequality by almost 164 percent, followed by Ethiopia with 65 percent. Also similar to the identity group breakdown, at least 11 percent of the gap is explained by education in all other countries except for Georgia, ranging from 46 percent in Ghana to 11 percent in Mexico. In the countries where education explains a smaller proportion of the gap, ‘discrimination’ accounts for the largest share of the overall wage gap.

[INSERT FIGURE 10 HERE]

The cost to the economy of maintaining education inequality is shown in the last column of Table 12. The costs, in terms of foregone annual wages, to an economy are computed by multiplying the reduced form per-worker wage increase from eliminating between-group education inequality with the total working age population. In terms of foregone total annual wages, it is greatest in South Africa costing about 119 billion PPP Dollars. At the same time, the costs remain relatively high for a number of countries, such as Nigeria (30 billion PPP dollars), Mexico (16 billion PPP dollars), and Ghana (7 billion PPP dollars). Even in small countries like Timor-Leste we observe a relatively sizeable cost of education inequality of about 133 million PPP dollars, which is equivalent to a 62 percent increase in the total annual wage bill.

5.3.3 Education Inequality and Employment Inequality

Lastly, Table 13 presents the results of the counterfactual labor market response to equalizing educational outcomes between gender-by-identity groups. It is clear that with high levels of educational equality, economic inequality would improve considerably. Across all countries in our sample, we find that employment and wage inequality both improve, to various degrees, as education inequality is lowered. For example, in Malawi, wage Gini coefficient would decrease by 33 points and the salaried employment Gini by 21 points when the education Gini coefficient is lowered by 34 points. In Timor-Leste, the wage Gini reduces by 32 points and the salaried employment Gini by 28 points in response to a 36-point reduction in the education Gini. Five

countries would see both their wage and salaried employment Gini coefficients decrease by at least 15 points. The labor market improvements are the most sizeable in Sub-Saharan African countries, while Latin American and Eastern European countries would see 1-8 point reductions in the wage and employment Gini coefficients due to proportional levels of education inequality.

[INSERT TABLE 13 HERE]

As shown in Figures 11 and 12, countries that equalize educational outcomes can expect to see corresponding decreases in wage and salaried employment inequality. Mexico, South Africa, and Nigeria were countries where reductions in education inequality between gender-by-identity groups do not produce a proportionally equivalent decreases in salaried employment inequality. However, the Pearson correlation coefficient for the bivariate relationship between changes in the education Gini and in the employment Gini is quite high at 0.84. On the other hand, the linear relationship between changes in the education Gini and the wage Gini has a lower variance around the fitted line and produces a higher correlation coefficient of 0.89. Nevertheless, these findings highlight a clear linear relationship between the two types of inequality, with changes in the Gini Index for education approximating a similar degree change in wage and employment inequality.

[INSERT FIGURES 11 and 12 HERE]

6 Conclusion

In much of the developing world, access to educational opportunities is not equitable between gender and identity groups, as with labor market opportunities. Based on the countries included in this paper, gaps in educational attainment are substantial especially among least developed countries such as in Sub Saharan Africa where males are approximately twice as likely to have completed secondary and/or tertiary education relative to females. Similarly, the same countries with high gender gaps are those with significant education inequality between identity groups and even more so between gender-by-identity groups. For instance, about 21 percent of working age Christians in Malawi have completed at least a secondary education relative to only about 7.7 percent of Muslims and only 3.5 percent of Muslim women. These gaps in education are accompanied by proportional gaps in employment opportunities as well.

This paper examines differences in salaried employment opportunity and earnings between gender, identity, and gender-by-identity groups focusing on their relationship with education inequality between those groups. The results of our analyses show that the majority of the gender employment and pay differential is explained not by education but by group membership, demographic characteristics, and discrimination (unobserved factors). Although the proportion explained by educational inequality is not as large between genders as it is between identity groups, across all countries in our sample education still explained, on average, about 15 to 17 percent of the total disparity in salaried employment and earnings. Thus, closing the gender

education gap would lead to an additional 3.9 million female workers in salaried occupations who otherwise would not be and an additional 48 billion dollars (PPP) in foregone wages.

In contrast, much of the disparities in economic opportunity between identity groups is explained by disparities in educational attainment. Across the 13 developing countries included in this analysis with identity identifiers, over half of the total salaried employment and wage gap between identity groups is explained by inequality in educational attainment. This also means that the opportunity cost of maintaining preexisting education inequality, across the 13 countries, is approximately 4.9 million workers who could be occupying salaried positions and a total of 149 billion dollars (PPP) in foregone wages. Obviously, the magnitude of the opportunity cost varies with the size of the economy and the size of the preexisting educational gaps, but the implications remain.¹⁶ Further, equalizing educational attainment between gender-by-identity groups would lead to even larger gains to the economy, or incur larger costs to the economy if education inequality is sustained. Across the same 13 countries, we calculate that an additional 7.5 million individuals would transition into a salaried position from either a non-salaried one, unemployment, or inactivity. In turn, this leads to an additional 15.6 billion dollars (PPP) in foregone wages in the absence of an equal educational distribution between groups.

Our research finds strong support for the contention that the elimination of gender and identity-group education inequalities results in large gains for disadvantaged groups and for the economy as a whole. We show that providing equal educational opportunities across identity groups within a given economy could lead to dramatic reductions in inequalities in economic opportunity. Further, we show that such policy with an added focus on girls' education can yield even larger returns to the economy both in terms of salaried employment rates and earned income among the most marginalized groups.

Our findings are consistent with Garcia-Aracil and Winter (2006) in Ecuador and Cunningham and Jacobsen (2008) in Bolivia, Brazil, Guatemala, and Guyana. We add to the existing literature by also showing that the between-group wage Gini coefficient is lowered by an average of 16 points relative to the mean Gini of 34 points when equalizing educational attainment between gender-by-identity groups, which is almost a 50 percent reduction, whereas focusing on identity group inequality only would lower the existing wage inequality by just under a third. Additionally, this study provides evidence of a clear linear relationship between utilizing education as a policy tool and reducing employment and income inequality. These findings provide additional support to the notion that employment and earnings gaps are attributed to gaps in attainment and informing policy makers as they move toward accomplishing the UN declared sustainable development goals, in particular goal 10.

¹⁶As a specific example, in South Africa, we show that the opportunity cost of maintaining is about 1.3 million potential salaried workers and 116 billion dollars (PPP) in foregone earnings.

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Tables and Figures

Table 1: Data Sources and Inequality Dimension

Country	Year	Gender	Group	Source
Albania	2012	Yes	Religion	WB - LSMS
Armenia	2013	Yes	N/A	WB - STEP
Bolivia	2012	Yes	Ethnicity	WB - STEP
Bosnia	2005	Yes	Ethnicity	WB - LSMS
Colombia	2012	Yes	N/A	WB - STEP
Ethiopia	2013	Yes	Religion	WB - LSMS
Georgia	2013	Yes	Ethnicity	WB - STEP
Ghana	2013	Yes	Ethnicity	WB - STEP
Iraq	2013	Yes	N/A	WB - LSMS
Kenya	2013	Yes	Ethnicity	WB - STEP
Malawi	2013	Yes	Religion	WB - LSMS
Mexico	2010	Yes	Ethnicity	IPUMS-International
Nigeria	2012	Yes	Religion	WB - LSMS
South Africa	2012	Yes	Ethnicity	IPUMS-International
Tajikistan	2009	Yes	Ethnicity	WB - LSMS
Tanzania	2013	Yes	N/A	WB - LSMS
Timor Leste	2007	Yes	Ethnicity	WB - LSMS
Uganda	2011	Yes	Ethnicity	WB - LSMS

Table 2: Distribution of Demographic Characteristics, by Country

	Obs	Groups	Female	Rural	Household Head	Married	Children	Age
Albania	11,822	4	0.505	0.451	0.345	0.853	1.3	41.9
Armenia	8,500	1	0.726	0.000	0.226	0.823	1.3	41.5
Bolivia	6,625	2	0.620	0.000	0.311	0.511	2.0	38.8
Bosnia	4,169	4	0.496	0.263	0.414	0.728	1.7	42.3
Colombia	6,780	1	0.608	0.000	0.406	0.293	1.3	40.4
Ethiopia	8,078	4	0.518	0.845	0.482	0.800	2.8	38.0
Georgia	8,250	2	0.717	0.000	0.237	0.782	1.2	41.2
Ghana	7,787	5	0.633	0.000	0.437	0.713	2.7	39.0
Iraq	57,558	1	0.522	0.281	0.354	0.812	3.3	38.8
Kenya	8,370	4	0.565	0.000	0.489	0.749	1.8	36.6
Malawi	5,986	3	0.523	0.828	0.479	0.817	3.4	37.8
Mexico	237,682	3	0.524	0.204	0.439	0.740	1.4	39.8
Nigeria	8,800	3	0.567	0.629	0.370	0.811	3.6	39.1
South Africa	38,036	4	0.513	0.572	0.467	0.388	1.5	39.1
Tajikistan	3,785	3	0.509	0.770	0.244	0.870	3.3	38.7
Tanzania	7,819	1	0.536	0.723	0.440	0.659	3.8	39.0
Timor-Leste	8,419	8	0.501	0.703	0.417	0.810	3.4	39.8
Uganda	4,625	7	0.554	0.810	0.451	0.761	4.5	38.3

Notes: Numbers in each cell represent the mean value or proportion of individual demographic characteristics. The column heading “Obs” represents the sample size of individuals between the ages of 25 years and 59 years. The column heading “Groups” represents the number of ethnic or religious groups identified within the sample.

Table 3: Distribution of Education Attainment, by Country

	Obs	Less than Primary	Completed Primary	Completed Secondary	Completed Tertiary
Albania	11,822	0.017	0.487	0.361	0.134
Armenia	8,500	0.002	0.058	0.379	0.561
Bolivia	6,625	0.190	0.200	0.260	0.349
Bosnia	4,169	0.135	0.259	0.536	0.071
Colombia	6,780	0.112	0.314	0.327	0.247
Ethiopia	8,078	0.586	0.292	0.105	0.017
Georgia	8,250	0.000	0.045	0.265	0.689
Ghana	7,787	0.290	0.424	0.166	0.121
Iraq	57,558	0.386	0.281	0.238	0.095
Kenya	8,370	0.198	0.430	0.274	0.097
Malawi	5,986	0.717	0.100	0.157	0.026
Mexico	237,682	0.190	0.489	0.192	0.129
Nigeria	8,800	0.421	0.215	0.217	0.147
South Africa	38,036	0.154	0.446	0.351	0.049
Tajikistan	3,785	0.059	0.146	0.673	0.121
Tanzania	7,819	0.332	0.584	0.077	0.007
Timor-Leste	8,419	0.619	0.200	0.158	0.023
Uganda	4,625	0.581	0.302	0.094	0.023

Notes: Numbers in each cell represent the mean value or proportion of individual demographic characteristics. The column heading "Obs" represents the sample size of individuals between the ages of 25 years and 59 years. Less than primary education includes no education.

Table 4: Distribution of Labor Market Outcomes, by Country

	Obs	Labor Force Participation	Employment	Salaried Employment	Annual Net Wage \$ PPP
Albania	11,822	0.564	0.453	0.395	\$3,194.4
Armenia	8,500	0.580	0.386	0.321	\$1,845.6
Bolivia	6,625	0.896	0.855	0.395	\$3,423.6
Bosnia	4,169	0.668	0.535	0.405	\$3,175.2
Colombia	6,780	0.820	0.739	0.421	\$3,804.0
Ethiopia	8,078	0.730	0.635	0.093	\$279.6
Georgia	8,250	0.573	0.339	0.276	\$2,017.2
Ghana	7,787	0.890	0.850	0.237	\$1,340.4
Iraq	57,558	0.533	0.459	0.325	\$4,867.2
Kenya	8,370	0.855	0.719	0.371	\$2,605.2
Malawi	5,986	0.818	0.705	0.130	\$474.0
Mexico	237,682	0.674	0.648	0.597	\$5,292.0
Nigeria	8,800	0.744	0.697	0.379	\$2,116.8
South Africa	38,036	0.732	0.595	0.502	\$7,910.4
Tajikistan	3,785	0.609	0.549	0.407	\$1,300.8
Tanzania	7,819	0.879	0.864	0.289	\$1,105.2
Timor-Leste	8,419	0.616	0.541	0.105	\$396.0
Uganda	4,625	0.857	0.829	0.137	\$513.6

Notes: Numbers in each cell represent the mean value or proportion of individual demographic characteristics. The column heading "Obs" represents the sample size of individuals between the ages of 25 years and 59 years. Less than primary education includes no education. Labor force participation, employment, and salaried employment are presented as a proportion of the total employment. Mean annual wages are presented inclusive non-earners with zero wages..

Table 5: Gender Oaxaca-Blinder Decomposition - Salaried Employment

Country	Year	\bar{Y}_F	D	U	E		Cost
					$\Delta\bar{E}D\alpha^*$	$\Delta\bar{X}\beta^*$	
Ghana	2013	0.132	0.286	0.125	0.090	0.072	534,254
Bosnia	2005	0.261	0.286	0.063	0.057	0.167	55,614
Bolivia	2012	0.328	0.196	0.134	0.051	0.011	122,300
Nigeria	2012	0.360	0.121	-0.044	0.050	0.115	1,551,784
Tajikistan	2009	0.235	0.350	0.184	0.050	0.116	68,402
Iraq	2013	0.083	0.508	0.228	0.047	0.232	287,581
Uganda	2011	0.076	0.163	0.087	0.040	0.037	204,940
Timor-Leste	2007	0.036	0.140	0.028	0.038	0.074	5,658
Malawi	2013	0.057	0.157	0.029	0.035	0.094	84,726
Ethiopia	2013	0.052	0.098	0.021	0.031	0.046	465,355
Kenya	2013	0.263	0.214	0.092	0.018	0.104	145,165
Tanzania	2013	0.207	0.183	0.059	0.009	0.116	74,186
Colombia	2012	0.330	0.233	0.168	0.009	0.056	116,720
Mexico	2010	0.409	0.395	0.200	0.005	0.190	130,224
South Africa	2012	0.429	0.151	0.049	0.003	0.099	36,018
Albania	2012	0.247	0.300	0.119	0.003	0.178	1,783
Armenia	2013	0.273	0.177	0.148	0.002	0.027	2,591
Georgia	2013	0.239	0.130	0.088	-0.013	0.055	-18,029

Notes: The figures in the table represent, from right to left, the country, year, salaried employment rate for females (\bar{Y}_F), the total difference between males and females ($D = \bar{Y}_M - \bar{Y}_F$), the difference attributed to unexplained factors (U), the difference attributed to education inequality ($\Delta\bar{E}D\alpha^*$) and differences in demographic characteristics ($\Delta\bar{X}\beta^*$), and the aggregate cost to the economy ($\text{Cost} = \Delta\bar{E}D\alpha^* \times \text{working age female population}$). Cost figures represent number of foregone female salaried workers.

Table 6: Gender Oaxaca-Blinder Decomposition - Net Wages (\$ PPP)

Country	Year	\bar{Y}_F	D	U	E	Cost	
					$\Delta\bar{E}D\alpha^*$	$\Delta\bar{X}\beta^*$	
Iraq	2013	\$1,259	\$7,546	\$3,019	\$1,026	\$3,501	\$6,221
Bolivia	2012	\$2,068	\$4,039	\$2,581	\$905	\$553	\$2,191
Ghana	2013	\$649	\$1,883	\$568	\$799	\$517	\$4,758
Nigeria	2012	\$1,314	\$2,169	\$102	\$538	\$1,529	\$16,631
Kenya	2013	\$1,612	\$1,694	\$471	\$472	\$752	\$3,899
Mexico	2010	\$3,226	\$4,337	\$1,912	\$244	\$2,181	\$6,514
Tajikistan	2009	\$391	\$1,852	\$943	\$231	\$678	\$318
Uganda	2011	\$231	\$731	\$236	\$214	\$281	\$1,103
Malawi	2013	\$205	\$576	\$37	\$206	\$332	\$501
Tanzania	2013	\$547	\$1,150	\$414	\$179	\$556	\$1,484
TimorLeste	2007	\$138	\$523	\$85	\$158	\$280	\$24
Colombia	2012	\$2,447	\$3,466	\$2,323	\$138	\$1,005	\$1,853
Serbia	2007	\$3,351	\$2,027	\$1,268	\$121	\$638	\$271
Ethiopia	2013	\$128	\$356	\$91	\$119	\$147	\$1,804
SouthAfrica	2012	\$6,043	\$3,830	\$1,998	\$77	\$1,755	\$879
Albania	2012	\$1,760	\$2,896	\$1,170	\$29	\$1,697	\$19
Armenia	2013	\$1,185	\$2,415	\$1,818	\$16	\$581	\$17
Georgia	2013	\$1,392	\$2,211	\$1,459	-\$121	\$873	-\$174

Notes: The figures in the table represent, from right to left, the country, year, salaried employment rate for females (\bar{Y}_F), the total difference between males and females ($D = \bar{Y}_M - \bar{Y}_F$), the difference attributed to unexplained factors (U), the difference attributed to education inequality ($\Delta\bar{E}D\alpha^*$) and differences in demographic characteristics ($\Delta\bar{X}\beta^*$), and the aggregate cost to the economy ($\text{Cost} = \Delta\bar{E}D\alpha^* \times \text{working age female population}$). Cost figures represent the aggregate amount of foregone annual wages due to education inequality, measured in millions of 2010 PPP dollars.

Table 7: Differences between Actual and Counterfactual Gender Inequality

Country	Year	G^{ed}	G^{emp}	\hat{G}^{emp}	$G^{emp} - \hat{G}^{emp}$	G^w	\hat{G}^w	$G^w - \hat{G}^w$
Ghana	2013	0.495	0.317	0.531	0.214	0.256	0.572	0.315
Malawi	2013	0.474	0.267	0.429	0.162	0.264	0.527	0.263
TimorLeste	2007	0.538	0.209	0.422	0.213	0.210	0.448	0.238
Ethiopia	2013	0.508	0.361	0.554	0.192	0.273	0.509	0.237
Uganda	2011	0.476	0.328	0.484	0.156	0.246	0.462	0.216
Nigeria	2012	0.615	0.731	0.853	0.122	0.367	0.532	0.165
Bolivia	2012	0.765	0.614	0.723	0.109	0.333	0.487	0.154
Kenya	2013	0.799	0.557	0.589	0.032	0.503	0.630	0.128
Iraq	2013	0.599	0.140	0.220	0.080	0.143	0.259	0.116
Bosnia	2005	0.697	0.477	0.581	0.104	0.390	0.495	0.105
Tajikistan	2009	0.848	0.401	0.486	0.085	0.174	0.278	0.103
Tanzania	2013	0.878	0.536	0.553	0.017	0.332	0.428	0.096
Mexico	2010	0.934	0.509	0.515	0.006	0.427	0.459	0.032
Colombia	2012	0.889	0.586	0.602	0.015	0.414	0.437	0.023
SouthAfrica	2012	0.959	0.740	0.745	0.005	0.613	0.620	0.007
Albania	2012	0.907	0.452	0.457	0.005	0.378	0.384	0.006
Armenia	2013	1.007	0.607	0.612	0.005	0.329	0.334	0.004
Georgia	2013	0.991	0.648	0.613	-0.035	0.386	0.353	-0.033

Notes: The figures in the table represent, from right to left, the country, year, actual gender education parity index ($G^{ed} = EDfED_M$), actual gender salaried employment parity index ($G^{emp} = \text{female-to-male salaried employment rate}$), counterfactual gender salaried employment parity index ($\hat{G}^{emp} = \text{counterfactual female-to-male salaried employment rate}$), the difference between actual and counterfactual employment parity indexes ($G^{emp} - \hat{G}^{emp}$), actual gender wage parity index ($G^w = \text{female-to-male wage ratio}$), counterfactual gender wage parity index ($\hat{G}^w = \text{counterfactual female-to-male wage ratio}$), and the difference between actual and counterfactual ($G^w - \hat{G}^w$).

Table 8: Identity Group Oaxaca-Blinder Decomposition - Salaried Employment

Country	Year	\bar{Y}_F	D	U	E		Cost
					$\Delta\bar{E}D\alpha^*$	$\Delta\bar{X}\beta^*$	
Timor-Leste	2007	0.074	0.196	0.021	0.099	0.077	24,552
Nigeria	2012	0.281	0.281	0.154	0.083	0.044	2,256,630
South Africa	2012	0.491	0.112	0.005	0.065	0.042	1,303,925
Ghana	2013	0.235	0.041	-0.027	0.058	0.010	515,822
Bolivia	2012	0.239	0.170	0.080	0.053	0.037	6,736
Albania	2012	0.387	0.129	0.063	0.052	0.014	62,848
Serbia	2007	0.457	0.062	0.007	0.043	0.011	26,890
Malawi	2013	0.063	0.084	0.048	0.037	-0.001	32,545
Georgia	2013	0.237	0.042	0.009	0.035	-0.002	4,372
Mexico	2010	0.574	0.029	-0.020	0.029	0.020	219,303
Uganda	2011	0.140	0.060	0.002	0.026	0.033	204,503
Kenya	2013	0.263	0.139	0.108	0.014	0.016	68,037
Ethiopia	2013	0.083	0.029	-0.005	0.010	0.023	160,698

Notes: The figures in the table represent, from right to left, the country, year, salaried employment rate for females (\bar{Y}_F), the total difference between males and females ($D = \bar{Y}_M - \bar{Y}_F$), the difference attributed to unexplained factors (U), the difference attributed to education inequality ($\Delta\bar{E}D\alpha^*$) and differences in demographic characteristics ($\Delta\bar{X}\beta^*$), and the aggregate cost to the economy ($\text{Cost} = \Delta\bar{E}D\alpha^* \times \text{working age female population}$). Cost figures represent number of foregone female salaried workers.

Table 9: Identity Group Oaxaca-Blinder Decomposition - Net Wages (\$ PPP)

Country	Year	\bar{Y}_F	D	U	E	Cost	
					$\Delta\bar{E}D\alpha^*$	$\Delta\bar{X}\beta^*$	
South Africa	2012	\$6,324	\$15,889	\$7,589	\$5,768	\$2,532	\$115,615
Mexico	2010	\$3,367	\$2,266	\$667	\$1,132	\$466	\$8,418
Bolivia	2012	\$2,157	\$1,526	\$315	\$765	\$445	\$96
Serbia	2007	\$3,451	\$1,044	\$309	\$685	\$51	\$426
Albania	2012	\$3,097	\$1,482	\$659	\$662	\$161	\$803
Nigeria	2012	\$1,362	\$1,925	\$1,032	\$572	\$322	\$15,629
Ghana	2013	\$1,269	\$1,190	\$645	\$517	\$29	\$4,572
Timor-Leste	2007	\$272	\$775	\$81	\$422	\$272	\$105
Georgia	2013	\$1,843	\$188	-\$192	\$345	\$35	\$43
Kenya	2013	\$1,512	\$1,254	\$829	\$321	\$104	\$1,542
Malawi	2013	\$194	\$353	\$159	\$208	-\$15	\$185
Uganda	2011	\$501	\$390	\$153	\$144	\$93	\$1,145
Ethiopia	2013	\$244	\$105	-\$2	\$49	\$58	\$757

Notes: The figures in the table represent, from right to left, the country, year, salaried employment rate for females (\bar{Y}_F), the total difference between males and females ($D = \bar{Y}_M - \bar{Y}_F$), the difference attributed to unexplained factors (U), the difference attributed to education inequality ($\Delta\bar{E}D\alpha^*$) and differences in demographic characteristics ($\Delta\bar{X}\beta^*$), and the aggregate cost to the economy ($\text{Cost} = \Delta\bar{E}D\alpha^* \times \text{working age female population}$). Cost figures represent the aggregate amount of foregone annual wages due to education inequality, measured in millions of 2010 PPP dollars.

Table 10: Differences between Actual and Counterfactual Identity Group Inequality

Country	Year	G^{ed}	G^{emp}	\hat{G}^{emp}	$G^{\text{emp}} - \hat{G}^{\text{emp}}$	G^{w}	\hat{G}^{w}	$G^{\text{w}} - \hat{G}^{\text{w}}$
Malawi	2013	0.284	0.280	0.135	-0.145	0.398	0.146	-0.251
Ethiopia	2013	0.150	0.229	0.069	-0.160	0.230	0.053	-0.177
Timor-Leste	2007	0.266	0.243	0.080	-0.163	0.253	0.080	-0.173
Ghana	2013	0.218	0.186	0.054	-0.132	0.247	0.096	-0.152
South Africa	2012	0.189	0.047	0.037	-0.010	0.274	0.127	-0.147
Kenya	2013	0.081	0.136	0.129	-0.007	0.260	0.121	-0.139
Bolivia	2012	0.151	0.149	0.083	-0.066	0.141	0.058	-0.083
Mexico	2010	0.168	0.012	0.000	-0.012	0.126	0.056	-0.070
Nigeria	2012	0.141	0.150	0.107	-0.043	0.194	0.130	-0.065
Uganda	2011	0.137	0.162	0.146	-0.016	0.235	0.176	-0.059
Serbia	2007	0.071	0.032	0.009	-0.023	0.066	0.021	-0.045
Albania	2012	0.094	0.100	0.075	-0.024	0.156	0.113	-0.043
Georgia	2013	0.017	0.043	0.007	-0.037	0.027	0.019	-0.008

Notes: The figures in the table represent, from right to left, the country, year, actual gender education parity index ($G^{\text{ed}} = \text{ED}_{\text{FEDM}}$), actual gender salaried employment parity index ($G^{\text{emp}} = \text{female-to-male salaried employment rate}$), counterfactual gender salaried employment parity index ($\hat{G}^{\text{emp}} = \text{counterfactual female-to-male salaried employment rate}$), the difference between actual and counterfactual employment parity indexes ($G^{\text{emp}} - \hat{G}^{\text{emp}}$), actual gender wage parity index ($G^{\text{w}} = \text{female-to-male wage ratio}$), counterfactual gender wage parity index ($\hat{G}^{\text{w}} = \text{counterfactual female-to-male wage ratio}$), and the difference between actual and counterfactual ($G^{\text{w}} - \hat{G}^{\text{w}}$).

Table 11: Gender-by-Identity Group Oaxaca-Blinder Decomposition - Salaried Employment

Country	Year	\bar{Y}_F	D	U	E		Cost
					$\Delta\bar{E}\bar{D}\alpha^*$	$\Delta\bar{X}_i\beta^*$	
Ghana	2013	0.171	0.297	0.114	0.121	0.062	876,720
Timor-Leste	2007	0.080	0.320	0.041	0.104	0.176	28,336
Nigeria	2012	0.364	0.254	0.036	0.072	0.145	3,090,057
South Africa	2012	0.494	0.167	0.003	0.061	0.103	1,254,465
Uganda	2011	0.149	0.023	-0.024	0.058	-0.011	518,417
Bolivia	2012	0.332	0.198	0.139	0.048	0.010	112,587
Malawi	2013	0.066	0.175	0.040	0.046	0.089	129,637
Albania	2012	0.381	0.289	0.139	0.042	0.108	50,865
Ethiopia	2013	0.092	0.050	-0.001	0.032	0.019	839,710
Kenya	2013	0.279	0.239	0.122	0.025	0.092	248,609
Serbia	2007	0.443	0.158	0.088	0.019	0.051	47,256
Mexico	2010	0.458	0.345	0.176	0.008	0.160	252,635
Georgia	2013	0.239	0.129	0.089	-0.010	0.050	-15,072

Notes: The figures in the table represent, from right to left, the country, year, salaried employment rate for females (\bar{Y}_F), the total difference between males and females ($D = \bar{Y}_M - \bar{Y}_F$), the difference attributed to unexplained factors (U), the difference attributed to education inequality ($\Delta\bar{E}\bar{D}\alpha^*$) and differences in demographic characteristics ($\Delta\bar{X}_i\beta^*$), and the aggregate cost to the economy ($\text{Cost} = \Delta\bar{E}\bar{D}\alpha^* \times \text{working age female population}$). Cost figures represent number of foregone female salaried workers.

Table 12: Gender-by-Identity Group Oaxaca-Blinder Decomposition - Net Wages (\$ PPP)

Country	Year	\bar{Y}_F	D	U	E	Cost	
					$\Delta\bar{E}D\alpha^*$	$\Delta\bar{X}\beta^*$	
South Africa	2012	\$6,696	\$20,582	\$9,624	\$5,794	\$5,165	\$118,760
Ghana	2013	\$860	\$2,070	\$625	\$948	\$497	\$6,838
Bolivia	2012	\$2,082	\$4,091	\$2,681	\$885	\$524	\$2,060
Nigeria	2012	\$1,641	\$3,068	\$650	\$702	\$1,716	\$30,046
Kenya	2013	\$1,774	\$1,898	\$581	\$571	\$746	\$5,570
Albania	2012	\$3,036	\$3,064	\$1,422	\$542	\$1,100	\$660
Mexico	2010	\$3,429	\$4,595	\$1,951	\$526	\$2,118	\$15,875
Timor-Leste	2007	\$294	\$1,272	\$135	\$487	\$649	\$133
Malawi	2013	\$232	\$662	\$74	\$277	\$311	\$776
Serbia	2007	\$3,533	\$1,922	\$1,130	\$260	\$533	\$658
Uganda	2011	\$554	\$154	-\$83	\$251	-\$15	\$2,246
Ethiopia	2013	\$277	\$177	-\$2	\$116	\$63	\$3,068
Georgia	2013	\$1,392	\$2,148	\$1,406	-\$95	\$837	-\$137

Notes: The figures in the table represent, from right to left, the country, year, salaried employment rate for females (\bar{Y}_F), the total difference between males and females ($D = \bar{Y}_M - \bar{Y}_F$), the difference attributed to unexplained factors (U), the difference attributed to education inequality ($\Delta\bar{E}D\alpha^*$) and differences in demographic characteristics ($\Delta\bar{X}\beta^*$), and the aggregate cost to the economy ($\text{Cost} = \Delta\bar{E}D\alpha^* \times \text{working age female population}$). Cost figures represent the aggregate amount of foregone annual wages due to education inequality, measured in millions of 2010 PPP dollars.

Table 13: Differences between Actual and Counterfactual Gender-by-Identity Group Inequality

Country	Year	G^{ed}	G^{emp}	\hat{G}^{emp}	$G^{\text{emp}} - \hat{G}^{\text{emp}}$	G^{w}	\hat{G}^{w}	$G^{\text{w}} - \hat{G}^{\text{w}}$
Malawi	2013	0.284	0.280	0.135	-0.145	0.398	0.146	-0.251
Ethiopia	2013	0.150	0.229	0.069	-0.160	0.230	0.053	-0.177
Timor-Leste	2007	0.266	0.243	0.080	-0.163	0.253	0.080	-0.173
Ghana	2013	0.218	0.186	0.054	-0.132	0.247	0.096	-0.152
South Africa	2012	0.189	0.047	0.037	-0.010	0.274	0.127	-0.147
Kenya	2013	0.081	0.136	0.129	-0.007	0.260	0.121	-0.139
Bolivia	2012	0.151	0.149	0.083	-0.066	0.141	0.058	-0.083
Mexico	2010	0.168	0.012	0.000	-0.012	0.126	0.056	-0.070
Nigeria	2012	0.141	0.150	0.107	-0.043	0.194	0.130	-0.065
Uganda	2011	0.137	0.162	0.146	-0.016	0.235	0.176	-0.059
Serbia	2007	0.071	0.032	0.009	-0.023	0.066	0.021	-0.045
Albania	2012	0.094	0.100	0.075	-0.024	0.156	0.113	-0.043
Georgia	2013	0.017	0.043	0.007	-0.037	0.027	0.019	-0.008

Notes: The figures in the table represent, from right to left, the country, year, actual gender education parity index ($G^{\text{ed}} = \text{EDFED}_M$), actual gender salaried employment parity index ($G^{\text{emp}} = \text{female-to-male salaried employment rate}$), counterfactual gender salaried employment parity index ($\hat{G}^{\text{emp}} = \text{counterfactual female-to-male salaried employment rate}$), the difference between actual and counterfactual employment parity indexes ($G^{\text{emp}} - \hat{G}^{\text{emp}}$), actual gender wage parity index ($G^{\text{w}} = \text{female-to-male wage ratio}$), counterfactual gender wage parity index ($\hat{G}^{\text{w}} = \text{counterfactual female-to-male wage ratio}$), and the difference between actual and counterfactual ($G^{\text{w}} - \hat{G}^{\text{w}}$).

Figure 1: Gender OB Decomposition (%) of Salaried Employment

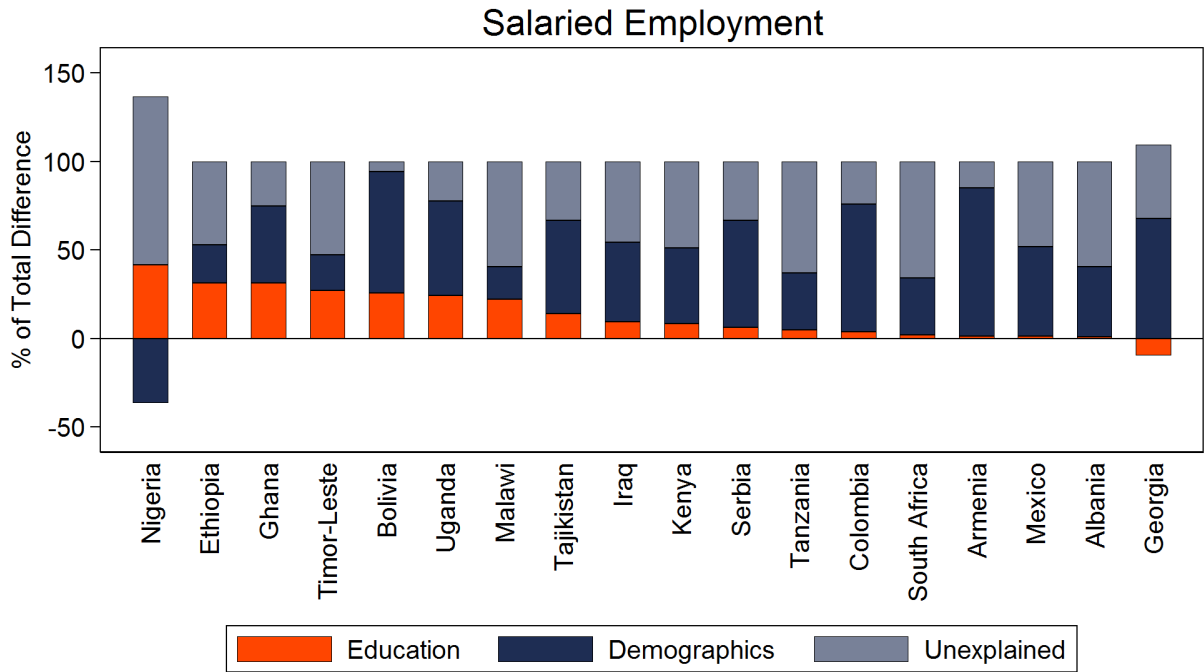


Figure 2: Gender OB Decomposition (%) of Wages (\$PPP)

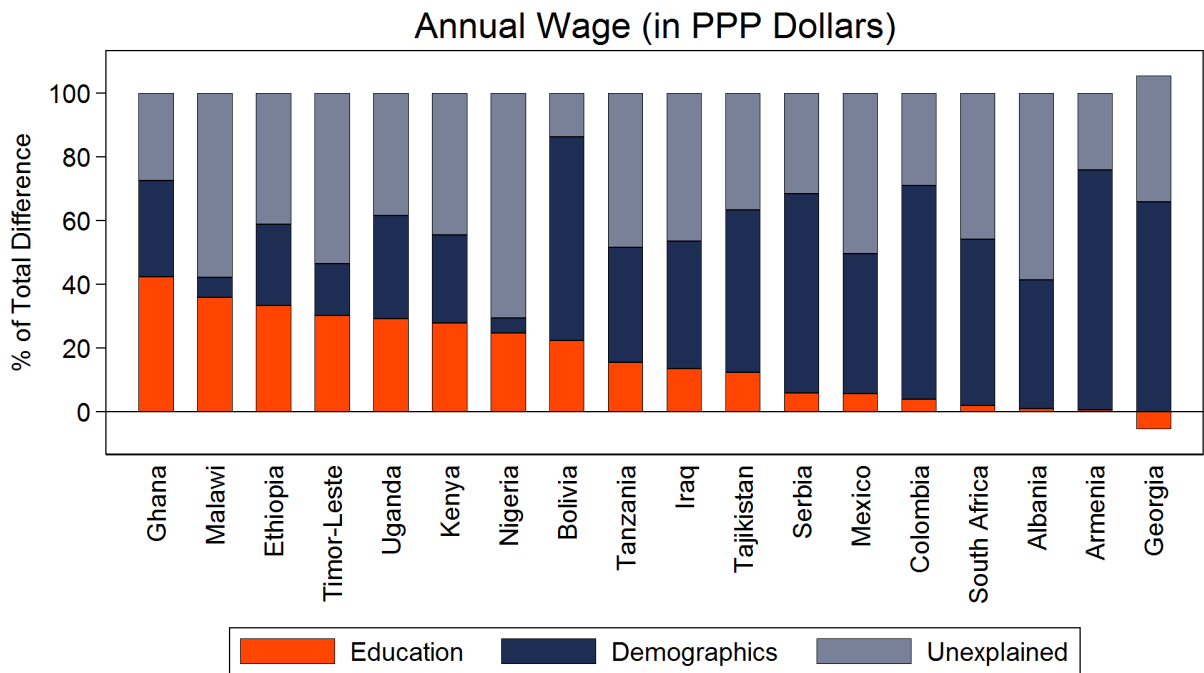


Figure 3: Counterfactual Employment and Education Inequality, Gender

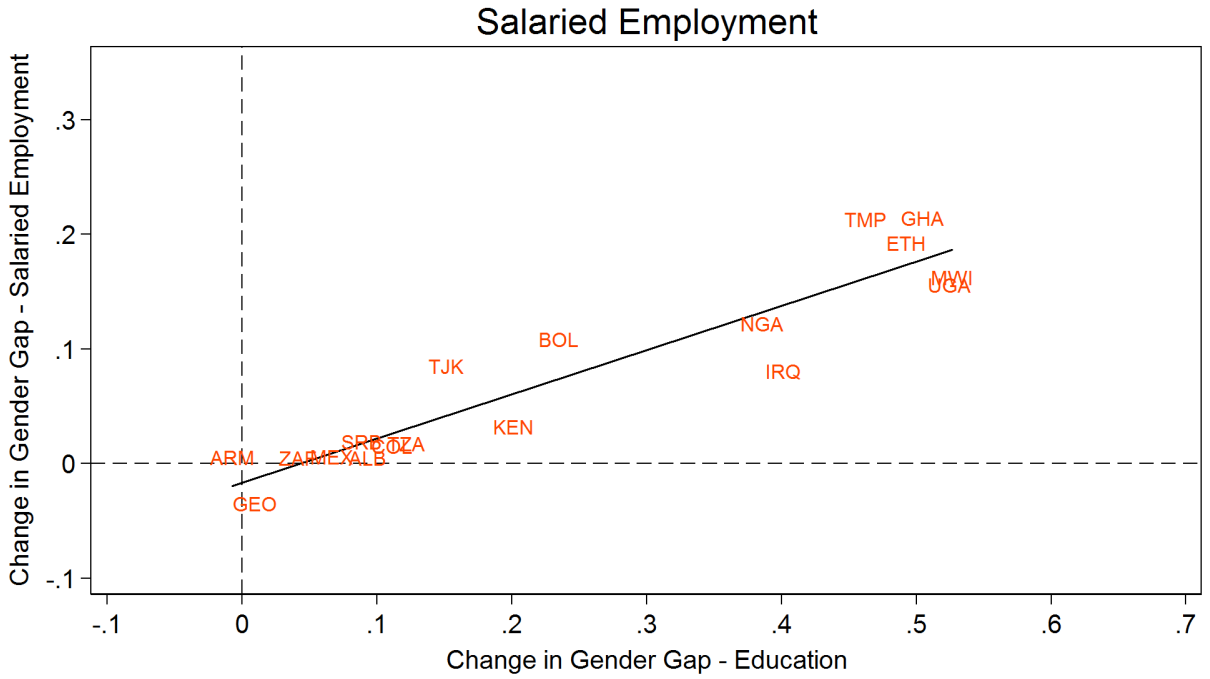


Figure 4: Counterfactual Wage and Education Inequality, Gender

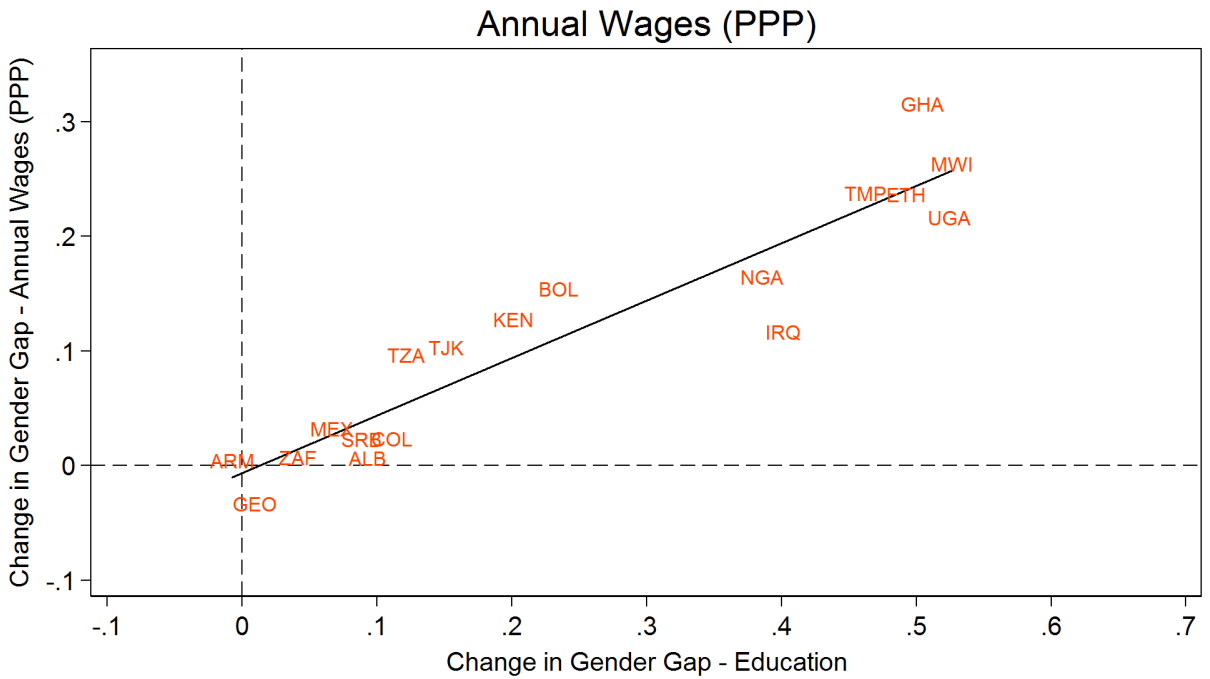


Figure 5: Identity Group OB Decomposition (%) of Salaried Employment

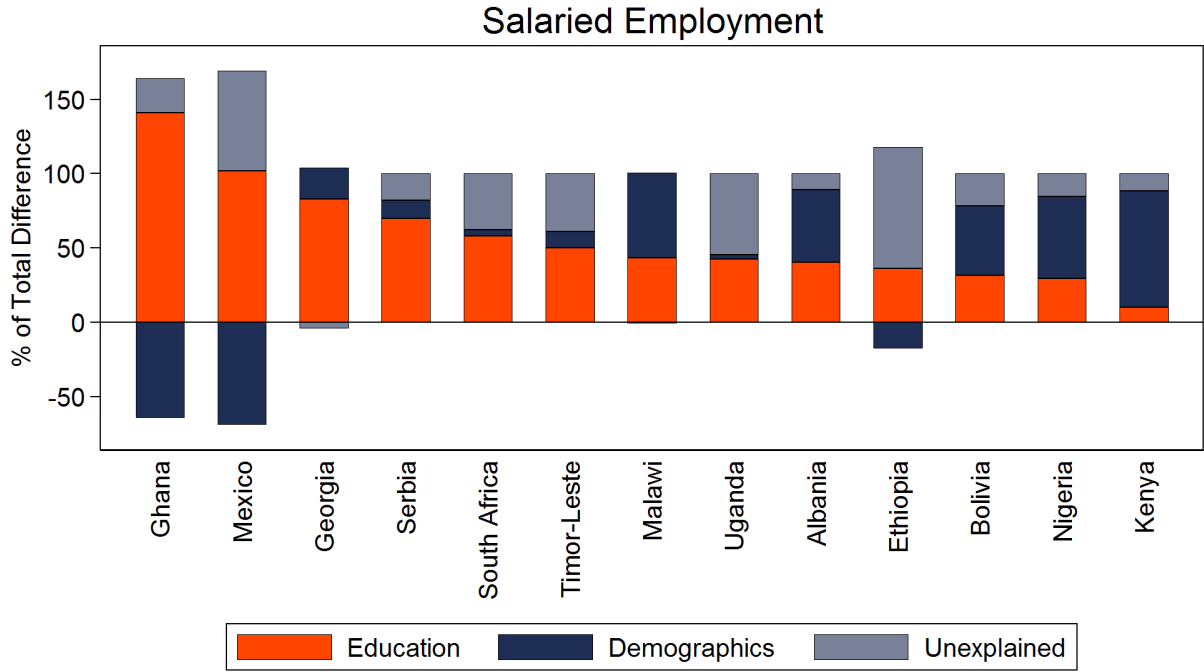


Figure 6: Identity Group OB Decomposition (%) of Wages (\$PPP)

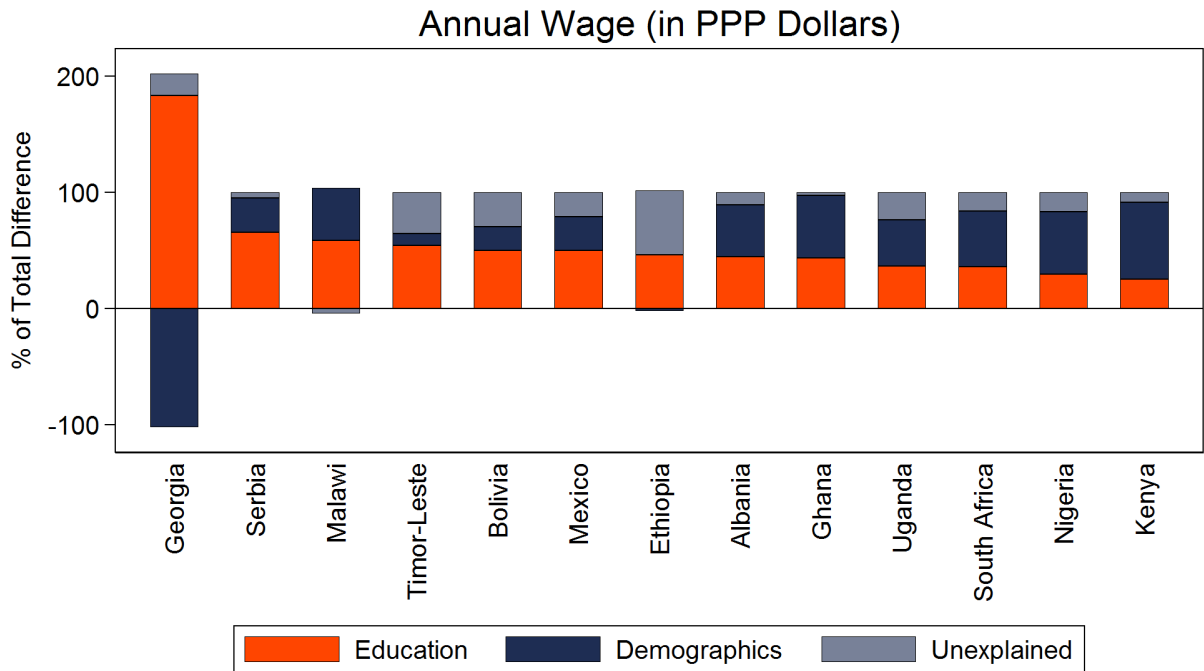


Figure 7: Counterfactual Employment and Education Inequality, Identity Group

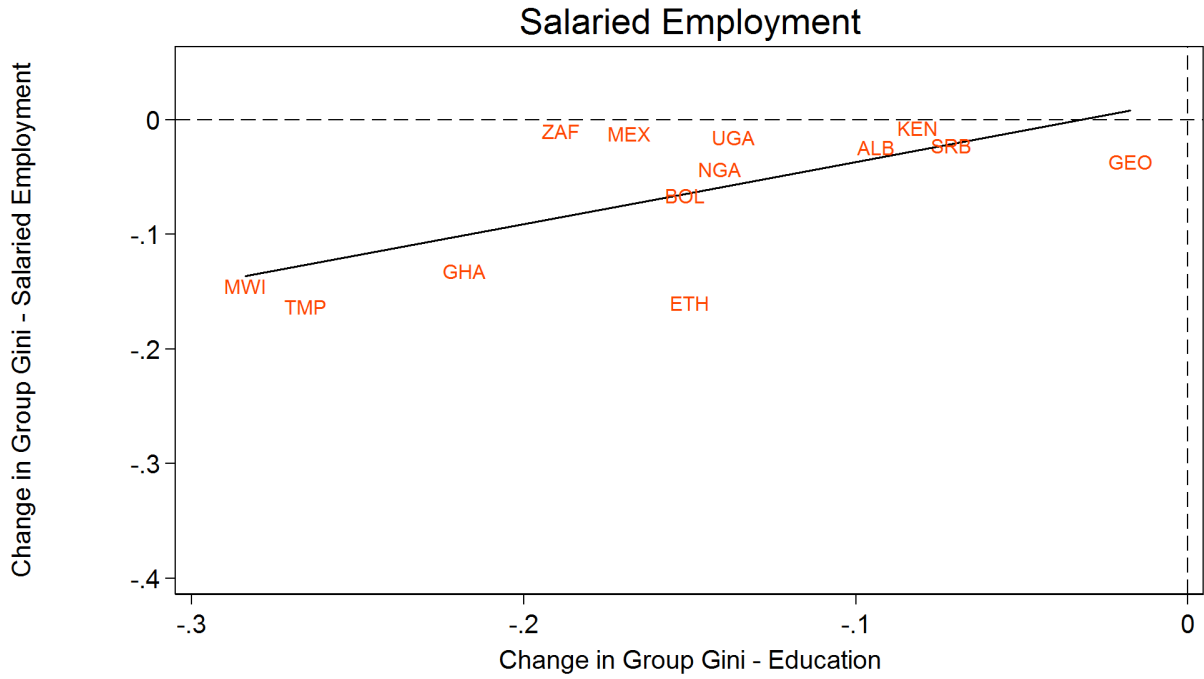


Figure 8: Counterfactual Wage and Education Inequality, Identity Group

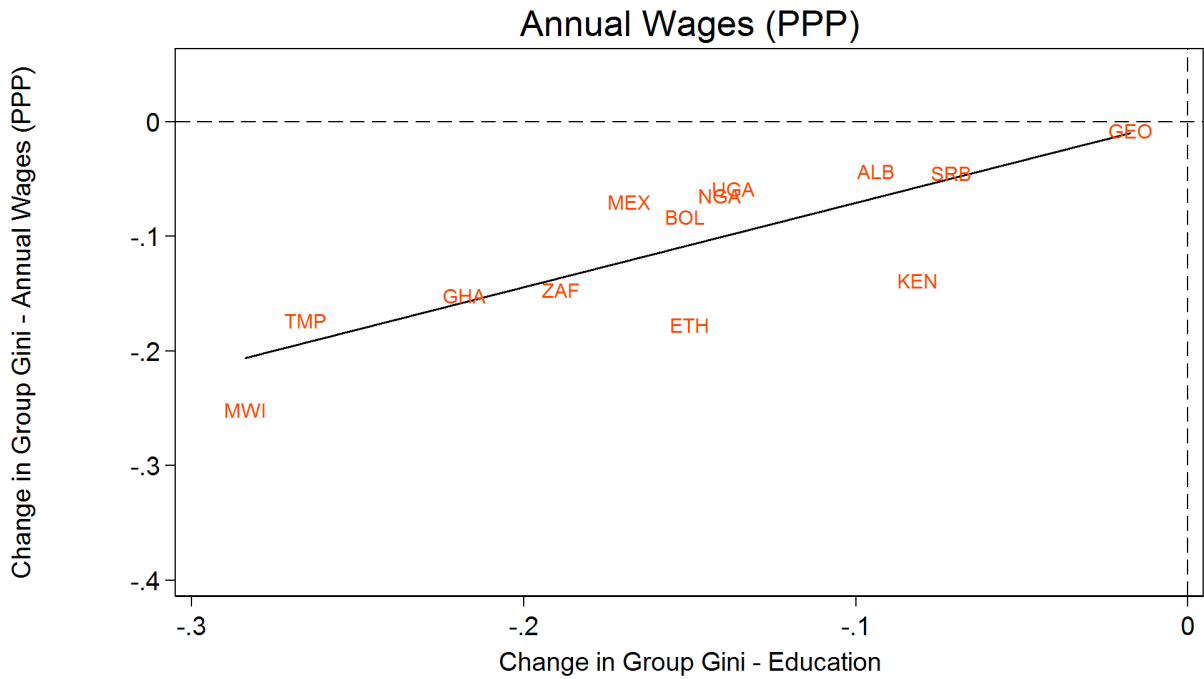


Figure 9: Gender-by-Identity Group OB Decomposition (%) of Salaried Employment

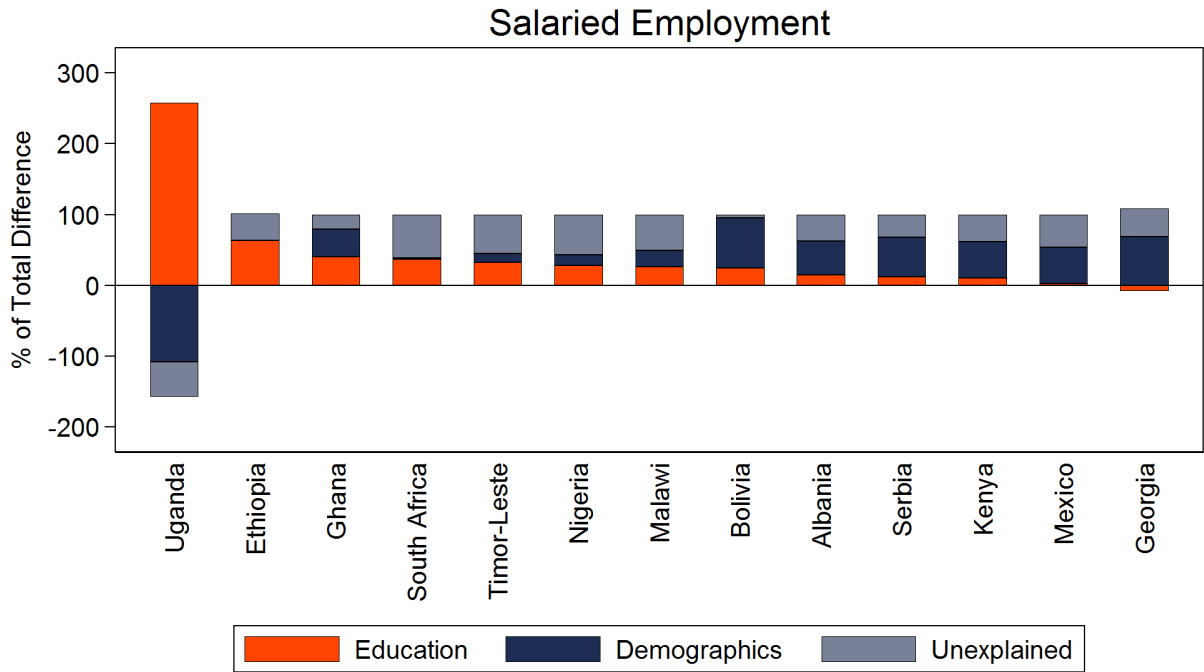


Figure 10: Gender-by-Identity Group OB Decomposition (%) of Wages (\$PPP)

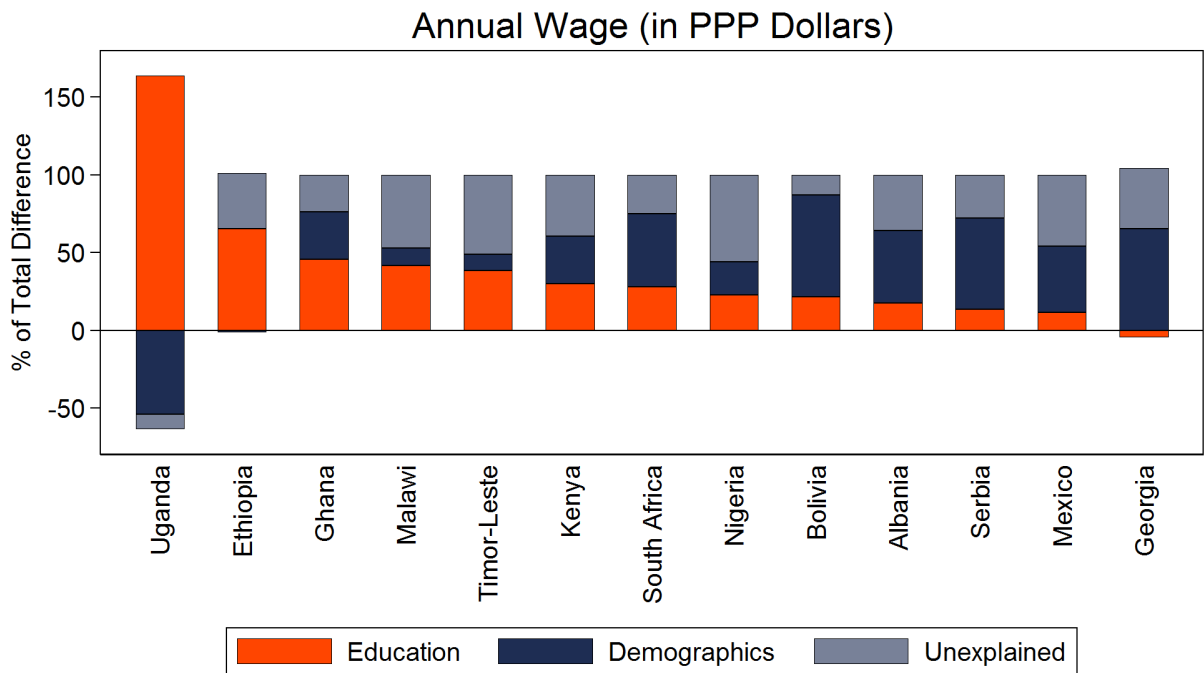


Figure 11: Counterfactual Employment and Education Inequality, Gender-by-Identity Group

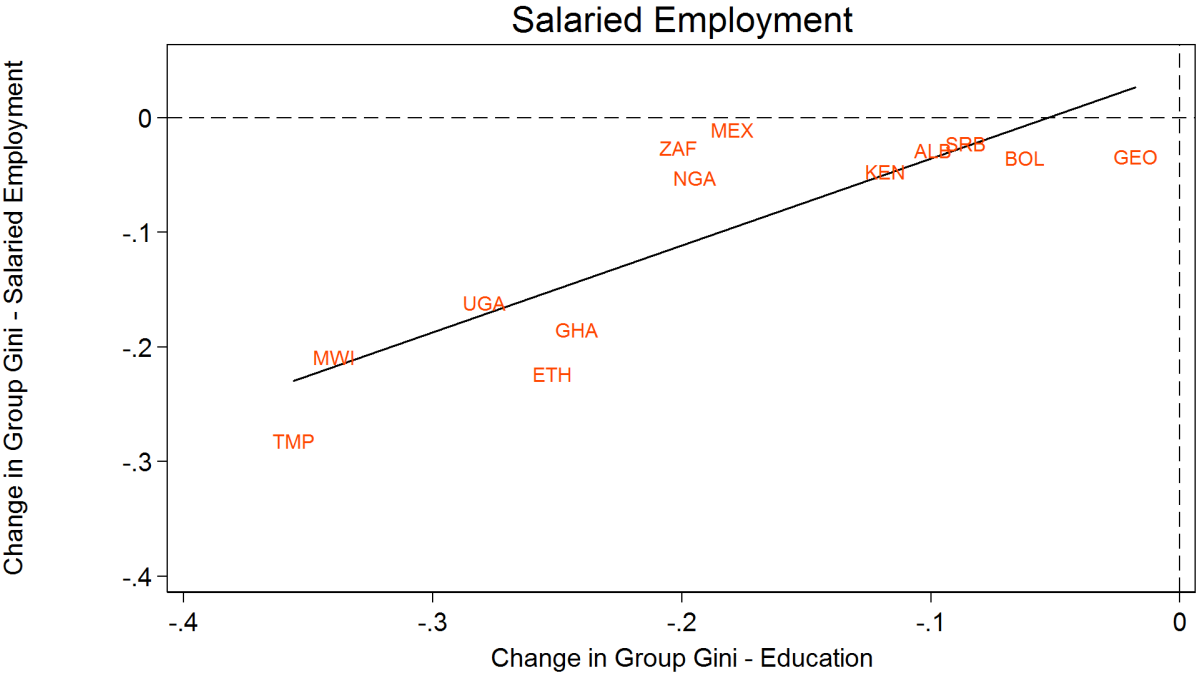


Figure 12: Counterfactual Wage and Education Inequality, Gender-by-Identity Group

