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# Financial Inclusion Gender Gap in Ethiopia: Evidence from Decomposition Analysis

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# Financial Inclusion Gender Gap in Ethiopia: Evidence from Decomposition Analysis

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## Abstract

Financial inclusion gender gap in Ethiopia is significantly high and how socioeconomic variables affect the gap is not sufficiently studied. Hence, this study examines financial inclusion gender gap in Ethiopia using the World Bank's Global Findex database of 2017. Hence, this study aims to examine the magnitude of financial inclusion gender gap and its socioeconomic determinants in Ethiopia using different econometric decomposition analysis. Empirical findings denote that there is statistically significant financial gender disparity in Ethiopia. Fairlie decomposition results show that being older, a man, more educated and richer favor financial inclusion with a higher influence of age, employment and education. Moreover, differences in coefficients, differences in productivity, advantage to males and disadvantage to females widen the gender gap in financial inclusion Ethiopia.

**Keywords:** Ethiopia, Gender Gap, Financial Inclusion, Decomposition Analysis

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# 1. Introduction

In economic development of any country the role of financial development is indispensable It is an important component of economic development as it is like a 'blood' of the economy. For the economy to remain healthy financial development needs to be circulated as blood does in the human body. A study made in 67 countries with low and middle countries suggests that financial development is a major tool to reduce poverty (Boukhatem, 2016; Nanziri, 2016; Ogunleye, 2017) Hence, financial development in one country denotes that there is alternative funding for poor and disadvantaged group because it enhances access to finance. Financial inclusion is one of the major indicators of financial development (Hajilee et al., 2017; Li, 2018; Singh, 2017).

Access, usage and quality are the three dimensions of financial inclusion. Access refers to affordability and physical proximity. Usage implies regularity, frequency and duration of time used whereas quality refers to customization of products to client needs and appropriate segmentation to develop products for all income levels (African Development Bank (AfDB), 2013).

According to Zins and Weill (2016) financial inclusion is basically related to having account at a formal financial institutions that enable a person to save and borrow money. Financial inclusion remains one of the most important development agenda. For that reason, there is a growing interest in intellects, financial institutions, governments, policy makers and others (Abel et al., 2018). In addition, World Bank is venturing to ensure the objective of achieving universal financial access by 2020. In more elaborative way world bank defines as follows;

> *"Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way"*(World Bank, 2018a).

Access to finance to household as well as enterprises level contributes for larger country level economic development (Aterido et al., 2013; Desalegn & Yemataw, 2017; Zins & Weill, 2016). We cannot think of development without finance. When there are fast and accessible financial services, it is easy for individuals as well as organizations to fulfill their need. In one way they are gratifying themselves, on the other and they are partaking in economic activities via different level investments. Hence, financial

inclusion denotes having all kinds of financial needs on continuous way for sustainable economic prosperity.

Initiative led by World Bank group focuses on accelerating the country-based reforms to achieve countries national financial inclusion goals. The initiative is called The Financial Inclusion Support Framework (FISF). Commenced in 2013 the initiative is supported by G20 countries to improve the existing situation regarding financial services in unbanked and underbanked sectors. With National support program and knowledge components, FISF is committed to help countries to build financially strong nations. National support program component under its four themes- National financial inclusion strategy, and monitoring and evaluation; Financial infrastructures, such as payments and credit reporting systems; Diversified financial services for individuals and enterprises; and Financial consumer protection and financial capability. Ethiopia is among few counties like Mozambique, Rwanda, Indonesia, Zambia, Pakistan, Vietnam and Cote d'Ivoire to launch Country Support Programs in 2015. Supporting Strategies for national financial inclusion in Ethiopia was also one of the moves of the initiative (World Bank, 2018b).

It appeared that financial inclusion of women is vital in broader socio-economic play of developing nations. (Sharma & Kukreja, 2013; Sujlana & Kiran, 2018) noted that for inclusive growth of a country, inclusive financing remains mandatory. Financially independent citizens contribute for strong and independent economy. Ensuring financial stability for citizens is ensuring sustainable development.

As its boldly manifested in World Bank Financial Inclusion Support Framework women financial inclusion is one of key focus areas. It is described as the following;

> *"As Knowledge component, FISFs supports analysis, synthesis, and knowledge sharing in key underserved areas, such as the financial inclusion of women and individuals engaged in agriculture and leveraging digital payments to provide access to a broader set of financial services"*(World Bank, 2018b).

Arguments on whether there is a gender gap in access to finance remain inconclusive (Aterido et al., 2013; Nanziri, 2016).

World Bank data shows one third of the population adult remains unbanked. Form these about half percent are women population which are living in rural areas. In developing nations, gender gap of

owning account is only 9 percent. This is really shocking news for countries since gender gap has a big implication to economic development. Financial exclusion of women hampers their participation in any economic activities, diminishes innovation and deteriorates participation in entrepreneurial endeavors (Fareed et al., 2017). Credit and other financial services can provide small-scale farmers with the opportunity to improve farm productivity and transition from subsistence farming to large-scale and commercial farming. In the short run, credit can help farmers increase their purchasing power to acquire necessary production inputs and finance their operating expenses, while in the long run it can help farmers to make profitable investments. Female farm managers in our data, however, are 9 percentage points less likely to live in a household with access to credit than male farm managers (World Bank, 2019).

One reason why woman may have less access to formal credit is that they are less likely to own and control physical assets that serve as collateral. Furthermore, on average, women have lower levels of human and social capital which, in turn, can decrease their eligibility for formal credit. This puts women at a disadvantage: when credit is constrained, farmers are likely to use suboptimal levels of productive inputs, thereby limiting their productive capacity (World Bank, 2019).

We find a robust negative relationship between being female and financial inclusion as in previous studies, and our analysis points to legal discrimination, lack of protection from harassment, including at the work place, and more diffuse gender norms as possible explanatory factors (Deléchat et al., 2018).

One important dimension in the access to finance debate, which has been less analyzed, is the gender gap. Specifically, it has often been argued that lack of access to finance impedes female entrepreneurship and prevents women from participating in the modern market economy. A recent global data complication shows the extent to which Sub-Saharan Africa (SSA) countries tend to be characterized by a degree of gender discrimination that is different from other regions. (Aterido et al., 2013).

According to 2017 data from the Global Findex Database published by the World Bank, women are still less likely than men to own an account at financial institutions (Demirgüç-Kunt et al., 2018).

Given this background, it is hard to identify to what extent gender differences in socioeconomic variables explain the gender gap in financial inclusion. Which socioeconomic characteristic has the

highest contribution to the gender gap and how the result differs with different indicators of financial inclusion?

Some economies have had gains in account ownership but missed out on opportunities for greater progress because women were insufficiently included. In Pakistan, for example, account ownership has doubled since 2011, though it started from a low base of 10 percent. But while it surged among men, it stagnated among women. In Ethiopia account ownership has risen by 18 percentage points among men since 2014, roughly twice the size of the increase among women ( Demirgüç-Kunt et al., 2018). At the economy level too, gender gaps have mostly remained stable. Economies that had no gender gap in 2014 generally still do not have one; the converse is also true. But there are exceptions. In 2014 no gender gap was found in Burkina Faso or Ethiopia. Since then, these two economies have seen big growth in account ownership — but more among men than among women. As a result, both now have a double-digit gender gap in account ownership.

Our paper contributes to the literature on access to finance along several dimensions. First, while most studies so far have been limited to one country, this is a cross-country exploration of gender differences in access to and use of financial services for both enterprises and households. Second, this paper considers access to and use of all financial services, not just credit as done in large parts of the literature. In addition, it also looks beyond formal financial services to informal financial services. Third, this paper contributes to the literature on gender differences in Sub-Saharan Africa. As rigorous analysis for SSA is often impeded by the lack of appropriate data, the data compilations used in this paper offer a unique opportunity to explore gender differences in the participation in formal and informal economies in SSA.

The remainder of this paper is organized as follows. The Section 2 focuses on the gender gap in enterprise finance using a large cross-section of firm-level surveys. Section 3 presents result on the gender gap in the use of financial services by individuals and Section 4 concludes

# 2. Data and Methods

## 3.1. Variables and Sources of Data

Data for the study were obtained from the 2017 Global Findex database. The 2017 Global Findex database were compiled using nationally representative surveys of more than 150,000 adults age 15 and above in over 140 countries. The current study has focused mainly on Ethiopia.

**Table 1: Variables Definition**

| Variable Name | Description |
|---|---|
| Account | The respondent owns (or not), alone or with someone, an account in a formal financial institution. It takes 1 if the individual owns an account, and 0 otherwise. |
| Borrowing | The respondent has (or not) saved in a formal account in the past 12 months. It takes 1 if the individual has saved in the past 12 months, and 0 otherwise. |
| Saving | The respondent has (or not) borrowed from a formal financial institution. It takes 1 if the individual has borrowed in the past 12 months, and 0 otherwise. |
| Emergency | Dummy that takes 1 if the respondent came up with emergency fund, and 0 otherwise. |
| Account Access Using Mobile Phone or Internet | Dummy that takes 1 if the respondent accessed account using mobile phone or internet, and 0 otherwise. |
| Female | Dummy that takes 1 if the respondent is a female, and 0 otherwise. |
| Education | Instruction level of the respondent: Primary education or less; and Secondary education. It takes 1 if the respondent completed Secondary education, and 0 otherwise |
| Age | Age of the respondent in years. |
| Age square | Age in years of the respondent squared |
| Income quantile | Income quintiles of the respondent: Poorest (20%), Second poorest (20%), Third poorest (20%), Fourth poorest (20%) and Fifth poorest (20%). |
| Employment Status | Dummy that takes 1 if the respondent is in workforce, and 0 otherwise. |

## 3.2. Estimation Strategies

The decomposition method developed by Blinder (1973) and Oaxaca (1973), and generalized by Neumark (1988) and Oaxaca and Ransom (1988, 1994) is widely used to decompose outcome variables between two groups into a part that is explained by differences in observed characteristics and a part attributable to differences in the returns to these characteristics (Bauer & Sinning, 2008; Fairlie, 2006, 2017; Jann, 2008; Sinning et al., 2008). The technique cannot be used directly, however, if the outcome is binary and the coefficients are from a logit or probit model (Fairlie, 2006).

For a linear regression, the standard Blinder-Oaxaca decomposition of the male/female gap in the average value of the dependent variable, $Y$, can be expressed as:

$$\bar{Y}^M - \bar{Y}^F = \left[\left(X^M - X^F\right)\hat{\beta}^M\right] + \left[\bar{X}^F\left(\hat{\beta}^M - \hat{\beta}^F\right)\right] \quad \text{.....(1)}$$

Where $\bar{X}^j$ is a row vector of average values of the independent variables and $\beta^j$ is a vector of coefficient estimates for gender $j$. Following Fairlie (1999, 2006), and Ghosh and Chaudhury (2019),

this study applied Fairlie decomposition technique for a nonlinear equation, $Y = F\left(X\hat{\beta}\right)$, to analyze the gender gap in financial inclusion in Ethiopia. Fairlie decomposition model can be specified as:

$$\bar{Y}^M - \bar{Y}^F = \left[\sum_{i=1}^{N^M} \frac{F\left(X_i^M \hat{\beta}^M\right)}{N^M} - \sum_{i=1}^{N^F} \frac{F\left(X_i^F \hat{\beta}^M\right)}{N^F}\right] + \left[\sum_{i=1}^{N^F} \frac{F\left(X_i^F \hat{\beta}^M\right)}{N^F} - \sum_{i=1}^{N^F} \frac{F\left(X_i^F \hat{\beta}^F\right)}{N^F}\right] \text{.....(2)}$$

Where, $N^j$ is the sample size for gender $j$ (M=male, F=Female). $\bar{Y}^j$ is the mean probability of outcome variable for sex $j$, $X_i^j$ is the vector of independent variables for case $i$ in sex $j$, $\hat{\beta}_i^j$ the vector of coefficient estimates including a constant term, and F is the cumulative distribution function from the logistic distribution. The first term in brackets represents the part of the gender gap that is due to group differences in distributions of X (i.e., differences in the distributions of the independent variables), and the second term represents the part due to differences in the group processes determining (i.e., differences in the coefficients) levels of Y. The second term also captures the portion of the gender gap due to group differences in unmeasurable, or unobserved endowments. Notably, we use the male coefficient estimates $\left(\hat{\beta}^M\right)$ as weights in the first term of the equation and the female distribution of independent variables $X^F$ as weights in the second term.

An equally valid expression for the decomposition is:

$$\bar{Y}^M - \bar{Y}^F = \left[\sum_{i=1}^{N^M} \frac{F\left(X_i^M \hat{\beta}^F\right)}{N^M} - \sum_{i=1}^{N^F} \frac{F\left(X_i^F \hat{\beta}^F\right)}{N^F}\right] + \left[\sum_{i=1}^{N^M} \frac{F\left(X_i^M \hat{\beta}^M\right)}{N^M} - \sum_{i=1}^{N^F} \frac{F\left(X_i^M \hat{\beta}^F\right)}{N^M}\right] \text{.....(3)}$$

Here, the female coefficient estimates, $\left(\hat{\beta}^F\right)$ are used as weights for the first term in the decomposition, and the male distributions of the independent variables, $\left(X^M\right)$ used as weights for the second term. This alternative method of calculating the decomposition often provides different estimates, which is the familiar index problem with the Blinder Oaxaca decomposition technique (Fairlie, 2006; Ghosh & Chaudhury, 2019). A third alternative is to weight the first term of the decomposition expression using coefficient estimates from a pooled sample of the two groups. We follow this approach in our study to calculate the decompositions. In particular, we have used coefficient estimates from a logit regression that includes a sample of all gender groups.

An additional calculation, however, is needed to identify the contribution of gender differences in specific variables to the gap. For example, assume that X includes two variables, $X_1$ and $X_2$. The independent contribution of $X_1$ to the gender gap can then be expressed as:

$$\frac{1}{N^F}\sum_{i=1}^{N^F} F\left(\hat{\alpha}^* + X_{1i}^M \hat{\beta}_1^* + X_{2i}^M \hat{\beta}_2^*\right) - F\left(\hat{\alpha}^* + X_{1i}^F \hat{\beta}_1^* + X_{2i}^M \hat{\beta}_2^*\right) \text{.....(4)}$$

Similarly, the contribution of $X_2$ can be expressed as:

$$\frac{1}{N^F}\sum_{i=1}^{N^F} F\left(\hat{\alpha}^* + X_{1i}^M \hat{\beta}_1^* + X_{2i}^M \hat{\beta}_2^*\right) - F\left(\hat{\alpha}^* + X_{1i}^M \hat{\beta}_1^* + X_{2i}^F \hat{\beta}_2^*\right) \quad \text{.....(5)}$$

A useful property of this technique is that the sum of the contributions from individual variables will be equal to the total contribution from all of the variables evaluated with the full sample. This technique estimates the total contribution of sex differences in the independent variables to the gender gap in the dependent variable. It also allows us to estimate the separate contribution of each independent (explanatory) variable to the overall gap. The contribution of each explanatory variable to the gap is thus equal to the change in the average predicted probability from replacing the female distribution with the male distribution of a specific variable, holding the distributions of the other variables constant.

The decomposition technique involves a one-to-one matching of cases between the two groups (Aterido et al., 2013; Ghosh & Chaudhury, 2019). Because the groups have different sizes, a sample is drawn and the process is repeated 1000 times reporting the mean results. Since the number of female and male is not identical, we draw a random subsample of females with or without replacement equal to the size of the full male sample, and matching the sample by their respective rankings in predicted probabilities. As the decomposition estimates are sensitive to the sub-sample chosen, we thus draw 1,000 different sub-samples and our results based on average values obtained from decompositions carried out over these sub-samples.

In order to allow the differences in financial inclusion between males and females to be decomposed into a part that is explained by differences in observed characteristics, a part attributable to differences in the estimated coefficients and a part that is explained by interactions between characteristics and coefficients we applied decomposition techniques proposed by (Daymont & Andrisani, 1984):

$$\bar{Y}_M - \bar{Y}_F = \left(\bar{Y}_M - \bar{Y}_F\right)\beta_F + \bar{X}_F\left(\beta_M - \beta_F\right) + \left(\bar{X}_M - \bar{X}_F\right)\left(\beta_M - \beta_F\right) = E + C + CE \quad \text{.....(6)}$$

where *E* is the part of the raw differential that is due to differences in endowments, *C* reflects the part attributable to differences in coefficients, and *CE* represents the part that can be explained by the interaction between *C* and *E*. Equation 6 is estimated using Stata command, "nldecompose," developed by Bauer and Sinning (2008).

Decomposition techniques discussed so far do not provide detailed decomposition to measure contribution of each independent variable to difference in financial inclusion between the two groups. Moreover, the techniques suffer from path dependency and identification problems related with the choice of a reference category which dummy variables are included among the independent variables. To overcome these problems we employed detailed decomposition method developed by Powers et al.(2011). This method handles path dependency (Schwiebert, 2015; Yun, 2004), computes asymptotic standard errors (Yun, 2005a), and overcoming the identification problem associated with the choice of a reference category when dummy variables are included among the predictors (Yun, 2005b, 2008). According to Powers et al. (2011) the raw difference can be expressed in terms of the overall components as a sum of weighted sums of the unique contributions.:

$$\bar{Y}_M - \bar{Y}_F = E + C = \sum_{k=1}^{K} W_{\Delta X_k} E + \sum_{k=1}^{K} W_{\Delta \beta_k} C = \sum_{k=1}^{K} E_k + \sum_{k=1}^{K} C_k \quad \text{.....(7)}$$

$$C = \sum_{k=1}^{K} C_k = \sum_{k=1}^{K} W_{\Delta\beta_k} \left\{ \overline{F\left(X_F \beta_M\right)} - \overline{F\left(X_F \beta_F\right)} \right\}$$

$$E = \sum_{k=1}^{K} E_k = \sum_{k=1}^{K} W_{\Delta X_k} \left\{ \overline{F\left(X_M \beta_M\right)} - \overline{F\left(X_F \beta_M\right)} \right\}$$

Where $W_{\Delta X_k}$ is weight component for the explained component (E) and $W_{\Delta\beta_k}$ is weight for unexplained component (C).

## 3. Results and Discussions

In this section we present both preliminary results based on descriptive statistics and econometric decomposition analysis from different decomposition techniques.

### 4.1.Descriptive Statistics

Descriptive statistics and inferential statistics such as t-test and chi-square test, given in Table I-IV of appendix part, are used to lay down a preliminary finding regarding gender differential in financial inclusion and selected socioeconomic variables. The results in Table I indicate that there is statistically significant age difference between males and females in our sample. Males are on average older than their female counterparts by three years.

Appendix: Table I-IV: elaborate the points

- Age: min (15), max (98), mean (33) and std (13.9)
- Sex: male (39.8%) and female (60.2%)
- There is statistically significant difference in age between males and females
- There is statistically significant difference in age squared between males and females
- There is no statistically significant difference in income between the two sexes
- There is statistically significant difference in status of education between males (63.8% primary and 36.2 secondary) and females (76.3% primary and 23.7% secondary).
- There is statistically significant difference in employment status between males and females. About 89.4% of males are in workforce compared to 69.6% of females.
- There are statistically significant differences between the two sexes regarding all indicators of financial inclusion.

### 4.2.Explaining Financial Inclusion Gender Gap

#### 4.2.1. Fairlie Nonlinear Decomposition Estimates

Fairlie's nonlinear decomposition results are given gin Table 2. As can be seen, the magnitude of financial inclusion gender gap differs across different indicators of financial inclusion. In all indicators, males are more likely to be financially included that their female counterparts. To be more specific, the gender gaps in formal account ownership, formal saving, borrowing, possibility of coming up with emergency fund and debit card holding are 16.5%, 16.6%, 8.9%, 8.4% and 5.8% respectively. These

rates are positive and statistically significant implying that males are 16.5%, 16.6%, 8.9%, 8.4% and 5.8% more likely to have formal account, formal saving, borrowing, possibility of coming up with emergency fund and debit card holding respectively.

We find that the lower use of formal financial services and digital financial services can be explained by gender disparity in age, income, education, and employment status. Our finding corroborates with the findings of Aterido et al. (2013) and Asuming et al.(2019) for Sub-Saharan Africa, Zins and Weill (2016), Botric and Broz (2017) for Central and Eastern Europe, and Ghosh and Chaudhury (2019) for India. Out of the total financial inclusion gender gap mentioned above, the proportion explained by socioeconomic characteristics (age, income, education and employment) differs across the financial inclusion indicators. In case of formal account ownership, only 35% of gap is explained by the socioeconomic variables. The socioeconomic variables explain 29.5% of gender gap in formal saving and 17.3% in borrowing. Among the financial inclusion indicators considered in this study, socioeconomic variables better explain gender gap in debit card holding (65.5%) while the contribution of the socioeconomic variables in explaining gender gap in case of the possibility of coming up with emergency fund is the least (7.1%). The results show that higher proportion of the gender gap in indicators of financial inclusion, except debit card holding, is attributed to differences in other factors across gender.

**Table 2: Fairlie Decomposition Result**

| **Variables** | **Formal Account** | | **Formal Saving** | | **Formal Borrowing** | |
|---|---|---|---|---|---|---|
| | **Logistic Results** | **Decomposition** | **Logistic Results** | **Decomposition** | **Logistic Results** | **Decomposition** |
| Gender | 0.530*** | | 0.604*** | | 0.377*** | |
| Age | 0.167*** | -0.102*** | 0.136*** | -0.095* | 0.049** | -0.021 |
| Age square | -0.002*** | 0.093*** | -0.002*** | 0.086* | -0.001** | 0.025 |
| Income1 | -1.803*** | -0.004 | -1.944*** | -0.002 | 0.199 | -0.002 |
| Income2 | -1.649*** | -0.002 | -1.337*** | -0.006** | 0.425* | 0.000 |
| Income3 | -1.178*** | 0.003 | -1.174*** | 0.006** | 0.124 | 0.001 |
| Income4 | -0.873*** | 0.005** | -0.774*** | 0.000 | 0.100 | 0.000 |
| Education | 1.513** | -0.041*** | 1.045*** | -0.024*** | -0.382** | 0.008 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Employment | 0.469*** | -0.008 | 0.700*** | -0.014** | 0.679*** | -0.028*** |
| Constant | -3.598*** | | -3.648*** | | -1.790*** | |
| Group (male) | | 0.530 | | 0.425 | | 0.455 |
| Group (female) | | 0.367 | | 0.259 | | 0.357 |
| Difference | | 0.163*** | | 0.166*** | | 0.098*** |
| Explained gap | | 0.057 (35%) | | 0.049 (29.5%) | | 0.017 (17.3%) |
| Unexplained gap | | 0.106 (65%) | | 0.117 (70.5%) | | 0.081 (82.7%) |
| Observations | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| $LR\ \chi^2(9)$ | 278.29 | | 219.33 | | 54.25 | |
| $\Pr ob > \chi^2$ | 0.203 | | 0.000 | | 0.040 | |

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

**Table 2: Continued**

| **Variables** | **Debit Card Holding** | | **Emergency** | |
|---|---|---|---|---|
| | **Logistic Results** | **Decomposition** | **Logistic Results** | **Decomposition** |
| Gender | 0.421 | | 0.406*** | |
| Age | 0.025 | -0.037 | 0.050** | -0.013 |
| Age square | 0.000 | 0.031 | -0.001*** | 0.021 |
| Income1 | 0.000 | | -1.918*** | 0.013*** |
| Income2 | 0.000 | | -1.174*** | 0.002 |
| Income3 | -1.674 | | -1.240*** | -0.002** |
| Income4 | -1.306 | -0.006*** | -0.142 | 0.001 |
| Education | 2.141 | -0.021** | 0.409** | -0.018*** |
| Employment | 0.992 | -0.005 | 0.211 | 0.002 |
| Constant | -4.462 | | 0.210 | |
| Group (male) | | 0.116 | | 0.673 |
| Group (female) | | .058 | | 0.589 |

| | | | | |
|---|---|---|---|---|
| Difference/gap | | 0.058*** | | 0.084*** |
| Explained gap | | 0.038 (65.5%) | | .006 (7.1%) |
| Unexplained gap | | 0.020 (34.5%) | | 0.078 (92.9%) |
| Observations | 1000 | 1000 | 1000 | 1000 |
| $LR\ \chi^2(7)$ | 125.87 | | 163.762 | |
| $\Pr ob > \chi^2$ | 0.000 | | 0.000 | |

The only determining factor for borrowing gender gap is employment status which reduces the observed gap. This is due to the fact that income which is mainly generated from employment is used as guarantee for borrowing under risky environment (Bell & Mukhopadhyay, 2020).

Lower proportion in financial inclusion gender gap in Ethiopia explained by the socio-economic characteristics indicates that other non-socioeconomic variables are also responsible for the reported gender gap. Literature indicates that different factors such as socio-cultural, institutional, legal and regulatory barriers are responsible for financial inclusion gender gap (see Adegbite & Machethe, 2020). Ethiopia has a diverse population, patrilineal ethnicity and traditions, particularly in rural areas, that make women vulnerable to socio-cultural norms. For instance, customary norms disfavor Ethiopian women to take part in land inheritance, ownership and transfer of these assets equivalent to their male counterparts (Bezu & Holden, 2014; Kumar & Quisumbing, 2015). Besides, young rural men in Ethiopia own less productive assets compared to males (Doss et al., 2018) which puts them at a disadvantage when seeking to use their assets as collateral for financial services, secure themselves against income shocks and attain higher incomes through the use of productive assets (IFAD, 2019).Customary beliefs limit Ethiopian women to engage in several agricultural activities necessitating male labor participation. These factors limit women's income generating activities and make them financially weak which in turn significantly reduce their likelihood of being included in financial services.

According to Demirgüç-Kunt et al. (2013) and Stevenson and St-Onge (2005) women in Ethiopia face greater and more systemic barriers to accessing formal financial services. According to the World Bank, (2019) only 24% of households in Ethiopia were female headed and productive assets are controlled by the household head in the Ethiopian context (Fafchamps & Quisumbing, 2002). As a result, most females rely on decisions of males in having access and using financial services regardless of their financial needs. This confirms the findings of Demirgüç-Kunt et al. (2013) and (Deléchat et al., 2018) that in countries with female restrictions on household headship, jobs, mobility, or asset ownership, women have a lower likelihood to have an account, borrow or save in a formal financial institution.

Abebe et al. (2017) argue that financial inclusion necessitates giving utmost attention to institutional issues like ensuring gender responsive finance innovations, quality, affordability, accessibility and sustainability. However, women in Ethiopia have lack of access to collateral, lack of formal identification and less mobility due to social norms (World Bank, 2017b). Inappropriate product offerings, lack of gender specific policies are also critical factors hindering women in Ethiopia from being financially included.

Legal and regulatory barriers are other challenges for Ethiopian women to be benefited from financial services. For instance, account opening requirements disadvantage women, barriers to obtaining formal identification, lack of gender-inclusive credit reporting (AFI (Alliance for Financial Inclusion), 2017; World Bank, 2017b). Furthermore, at least within urban areas, we found substantial disparities across gender; older adolescent boys were significantly more likely than girls of the same age to have control over financial resources (39% compared to 21%)(Jones et al., 2019).

### 4.2.2. Daymont and Andrisani Decomposition Estimates

In this section we break down the total gender gap in the selected financial inclusion indicators into differences in characteristics, differences in coefficient and interaction effects. The decomposition results (gender gap) are consistent with results presented in Table 2. It indicates that females lag behind in all indicators of financial inclusion compared to their male counterparts. In what follows we analyzed factors responsible for the gender disparity.

*Table 3: Daymont and Andrisani Decomposition Result*

| | Saving | | Account | | Borrowing | | Emergency | | Debit Card | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | % | Coef. | % | Coef. | % | Coef. | % | Coef. | % |
| $Omega = 1$ | | | | | | | | | | |
| Char | .049*** | 29.5 | .057*** | 35.1 | .017 | 17.2 | -.006 | -7.2 | .031*** | 54.2 |
| Coef | .096*** | 57.7 | .071** | 43.4 | .108*** | 110.9 | .043 | 51.4 | .006 | 10.4 |
| Int | .021 | 12.8 | .035* | 21.5 | -.027 | -28.1 | .047* | 55.8 | .020 | 35.3 |
| $Omega = 0$ | | | | | | | | | | |
| Char | .070*** | 42.3 | .092*** | 56.5 | -.011 | -10.9 | .041 | 48.6 | .051 | 89.6 |
| Coef | .117*** | 70.4 | .106*** | 65 | .081** | 82.7 | .090*** | 107.2 | .026 | 45.8 |
| Int | -.021 | -12.8 | -.035* | -21.5 | .027 | 28.2 | -.047* | -55.8 | -.020*** | 35.3 |
| $Omega = wgt$ | | | | | | | | | | |
| Prod | .065*** | 39.5 | .073*** | 45 | .019 | 19.1 | .012 | 14.5 | .042*** | 73.1 |
| Adv | .060*** | 36.4 | .054*** | 33.1 | .048*** | 48.7 | .043*** | 51.5 | .009 | 16.2 |
| Disadv | .040*** | 24.1 | .034*** | 21.9 | .031*** | 32.2 | .028*** | 34.0 | .006 | 10.7 |
| Raw | .165*** | | 0.163*** | | .098*** | | .084*** | | .057*** | |

The weighting proposed by Neumark (1988) was applied in specifying Omega and bootstrap method was used to drive analytic standard errors of the components of the decomposition equation so as to judge the statistical significance of the estimates.

As can be seen, the total gender gap in financial inclusion is decomposed into three components: differences in observable characteristics, differences in coefficients and the interaction between characteristics and coefficients. Moreover, the total gender disparity regarding financial inclusion is decomposed into differences in productivity, advantages to males and disadvantage and disadvantages to women.

For formal saving, the estimates of characteristics and coefficient are positive and statistically significant at 1% level of significance implying that the gender gap in formal saving is attributable to both differences in observable characteristics and coefficients. Both characteristics and coefficients widen the female-male gender gap in financial inclusion. The total gender differential in formal saving is due to differences in a different productivity (39.5%), advantage to males (36.4%) and disadvantage to females (24.1%).

In case of formal account holding, differences in observable characteristics, differences in coefficient and their interaction are responsible for the gender gap. All estimates are positive and statistically significant implying that they all contribute in widening the gap between males and females in holding formal account. Out of the total gender disparity in account holding (16.3%), 45% is explained by difference in different productivity, 33.1% is explained by advantage to males and the remaining 21.9% is attributed to disadvantage to females.

Gender disparity in formal borrowing is explained by difference in coefficient which explains 110.9% when Omega is 0 and 82.7% when Omega is 0. A 9.8% of gender gap in formal borrowing is explained by advantage to males (48.7%) and females (32.2%) which indicated that there are no differences in a different productivity in case of formal borrowing.

Gender gap observed in possibility of coming up with emergency fund is explained by advantage to males (51.5%) and disadvantage to females (34%) while only difference in a different productivity is responsible for explaining about 74.1% of the gender disparity in credit card holding.

### 4.2.3. Detailed Decomposition Estimates

The contributions of each of the socioeconomic variables to the financial inclusion gender gap rate between males and females are reported in Table 4. As can be seen, Table 4 summarizes decomposition results along with contribution of each socioeconomic variable to the total gender gap in financial inclusion. The first part of the table presents decomposition results which is consistent with results provided in Table 3 above. Four each indicator of financial inclusion the total financial inclusion gender gap is decomposed into gap due to differences in socioeconomic characteristics and differences in coefficients.

We find that differences in effects account for 57.7% of the observed gender differential in formal saving, with differences in age accounting for most of this (434%). Differences in endowments explain only 42.3% of the total gender gap in formal saving, with differences in age (100%) followed by employment status (74.3%) accounting for most of the disparity. Age disparity across gender strongly explains the financial gender gap in Ethiopia during the study period due to the fact that income and asset accumulation is positively correlated with age. The average age of women in our sample is less than their male counterparts which shows that men have age-related advantages. Moreover, gender differential in employment status is huge in Ethiopia. Empirical evidences reveal that Ethiopian women are less likely to be employed, more likely to be underemployed and more likely to earn lower earnings from their employment (CSA, 2014; Mat, 2020) due to limited access to training and education (Mat, 2020). According to the World Economic Forum (WEF, 2020) only 77% of women were employed compared to 88% of males. Moreover, young women in Ethiopia are less economically active than their male counterparts. According to Mat (2020) and World Bank (2017) young women in Ethiopia who are not in employment, education or training (NEET) are higher than young men (15.1% for women vs. 5.7% for men). The World Economic Forum (WEF, 2020) report shows that Ethiopian gender parity in education is low (85%, with the rank of $140^{th}$ ) due to the fact that human capital investment are insufficient and penalized women than men which resulted in low literacy rate for women (44% of women vs. 59% of men). Low employment, low skills and education of women resulted in low earning rate.

It implies that equalizing employment status between males and females would be expected to reduce gender gap in formal saving by 74.3%. Differences in income level 1 (poorest 20%) and age square are responsible for widening the gap while the remaining socioeconomic variables narrowed the observed

formal saving gender gap. Differences in coefficients of fourth quantile of income would be expected to widen gender disparity in formal saving while that of that of age has a narrowing effect.

Gender gap in account holding at formal financial institution is attributed differences in endowments which explained about 56.6% of the total gap and differences in effects explained 43.4%. Out of the total observed gender gap in account holding a larger proportion is explained by difference in age (64.3%) followed by employment status (28.4%) and educational level (21.4%). Except the first quantile of income and age square which played a widening role, all included socioeconomic variables would be expected to narrow down the gender gap in holding formal account in Ethiopia.

Gender disparity in possibility of coming up with emergency fund is explained by differences in socioeconomic characteristics of individuals which contributed about 48.6% to the total gender gap. The dominant proportions are hold by age (62.9%) and employment status (44.9%), both variables would be expected to reduce the gap in explaining the gender disparity observed. Moreover, the second, third and fourth quantiles of income narrowed down the observed gender gap.

***Table 4:Detailed Decomposition Results***

| | **Saving** | | **Account** | | **Borrowing** | | **Emergency** | |
|---|---|---|---|---|---|---|---|---|
| **Decomposition Results** | | | | | | | | |
| | **Coef.** | **%** | **Coef.** | **%** | **Coef.** | **%** | **Coef.** | **%** |
| **E** | .070*** | 42.3 | .092*** | 56.6 | -.011 | -10.9 | .041** | 48.6 |
| **C** | .095*** | 57.7 | .071** | 43.4 | .109*** | 110.9 | .043 | 51.4 |
| **R** | .165*** | | .163*** | | .098*** | | .084*** | |
| **Due to Difference in Characteristics (E)** | | | | | | | | |
| Age | .113*** | 100.44 | .105*** | 64.254 | .048** | 49.3 | .053*** | 62.9 |
| Age square | -.104*** | -80.307 | -.093*** | -57.21 | -.056** | -57.7 | -.054*** | -64.5 |
| Income1 | -.011*** | -10.745 | -.009*** | -5.7869 | .000 | .6 | -.012*** | -12.7 |
| Income2 | .002** | 1.8019 | .002*** | 1.2361 | -.001** | -1.1 | .002*** | 1.9 |
| Income3 | .0023*** | 3.2095 | .002** | 1.7949 | -.000 | -.1 | .007*** | 7.8 |
| Income4 | .007*** | 7.0639 | .004** | 2.4683 | -.001 | -1.1 | .004** | 4.9 |
| Education | .023** | 15.653 | .035*** | 21.404 | -.011 | -11.6 | .003 | 3.4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Employment | .038*** | 74.342 | .046*** | 28.403 | .010 | 10.8 | .034** | 44.9 |
| **Due to Differences in Coefficients (C)** | | | | | | | | |
| Age | .718* | 434.1 | .4005 | 245.7 | .398 | 407.7 | .466 | 556.5 |
| Age square | -.291 | -175.7 | -.147 | -90 | -.174 | -177.8 | -.146 | -174.2 |
| Income1 | .001 | .8 | .006 | 3.4 | -.006 | -6.4 | .008 | 9.7 |
| Income2 | -.006 | -3.4 | -.005 | -2.9 | .023 | 23.6 | -.006 | -6.6 |
| Income3 | .015 | 8.9 | .022 | 13.7 | -.007 | -7.5 | -.031** | -37.6 |
| Income4 | -.036** | -22.3 | .002 | 1.2 | .009 | 9.3 | -.048** | -57.3 |
| Education | -.006 | -3.9 | -.006 | -3.4 | -.004 | -3.7 | -.028 | -34 |
| Employment | .052 | 31.2 | .150 | 92.3 | -.088 | -90.5 | .141** | 168.4 |
| Constant | -.351 | -212.1 | -.353 | -216.5 | -.043 | -43.8 | -.312 | -373.3 |

## 4. Conclusions and Policy Implications

Even though financial inclusion has shown improvement over time both for men and women, the gender gap remains stable. Exclusion of women from financial services has implications on financial inclusion progress itself, women's political, economic and social engagements. Bridging the financial inclusion gender gap is required to achieve sustainable development outcomes. The primary aim of this study is examining the financial inclusion gender gap and role of socioeconomic variables in explaining the gap using different econometric decomposition techniques. For this purpose, we used the Global FINDEX 2017 data by the World Bank so as to forward policy recommendations relevant for bridging the gap.

Using Fairlie decomposition techniques, we examined the existence financial gender gap in financial inclusion. The empirical findings reveal that women are less likely to be financially included in all indicators of financial inclusion. Except in debit card holding, the included socio-economic variables explain less than 40% of the total gender gap indicating that the gap is also attributed to factors like socio-cultural, institutional, legal and regulatory issues. Age, employment status and educational level are among socio-economic variables that consistently explain financial inclusion gender gap across all indicators during the study period.

We also used Daymont and Andrisani (1984) technique to further decompose the total financial inclusion gender gap into socio-economic gender differences, differences in coefficients and differences in interaction of the two. Additionally, this technique decomposes the overall gender gap into differences in productivity, advantages to men and disadvantages to women. The empirical findings suggest that differences in observable characteristics and coefficients explain gender differences in saving and account holding in Ethiopia while disparity in borrowing and coming up with emergency fund is attributed exclusively to differences in coefficients. Gender gap in saving and formal account holding is due to differences in productivity, advantages to men and disadvantages to women while gender disparity in borrowing and debit card holding is attributed to advantages to men and disadvantages to

women. Only differences in productivity explains gender gap in the possibility of coming up with emergency fund.

By applying detailed decomposition approach, we also scrutinized the extent to which the socio-economic variables explain the financial inclusion gender gap in Ethiopia. We found that financial inclusion gender gap in Ethiopia is mainly due to differences in included observable socio-economic variables rather than differences in coefficients and variables playing crucial role in this case are age, employment status and educational level of the respondents. In summary, lower education, lower employment, lower age and lower earnings/income among females in Ethiopia prohibits them from using financial services. However, socio-economic variables explain less than half of the gender gap in financial inclusion in most indicators. Therefore, future studies need to focus on the impact of socio-economic, socio-cultural, institutional, legal and regulatory factors in the study of financial inclusion gender gap in Ethiopia. Policies, to improve access to financial services for the women, need to address the growing gender gap in employment, education and earnings/income.

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## Authors' contributions
SKH conceived the idea, wrote the methodology part and produced the econometric results. DTT wrote the introduction and descriptive parts and edited the whole manuscript. Both authors read and approved the final manuscript.

## Availability of data and materials
Dataset analyzed in this study are available upon request.

## Competing interests
The authors declare that they have no competing interests.

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# Appendix
**Table 5: Statistical Significance of Gender Gap in Respondent's Age (t-test)**

```
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  Female |     602    31.89203     .536695    13.16818      30.838    32.94605
    Male |     398    34.62312    .7448988    14.86069    33.15868    36.08755
---------+--------------------------------------------------------------------
combined |   1,000      32.979    .4403049    13.92366    32.11497    33.84303
---------+--------------------------------------------------------------------
    diff |           -2.731089    .8958148               -4.488986   -.9731923
------------------------------------------------------------------------------
    diff = mean(Female) - mean(Male)                              t =  -3.0487
Ho: diff = 0                                     degrees of freedom =      998

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0012         Pr(|T| > |t|) = 0.0024          Pr(T > t) = 0.9988
```

**Table 6: Statistical Significance of Gender Gap in Respondent's Age-Square (t-test)**

```
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  Female |     602    1190.214    43.68786    1071.912    1104.415    1276.014
    Male |     398    1419.045    66.10657    1318.822    1289.083    1549.008
---------+--------------------------------------------------------------------
combined |   1,000    1281.289     37.3495    1181.095    1207.997    1354.581
---------+--------------------------------------------------------------------
    diff |           -228.8309     75.9974               -377.964    -79.6979
------------------------------------------------------------------------------
    diff = mean(Female) - mean(Male)                              t =  -3.0110
Ho: diff = 0                                     degrees of freedom =      998

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0013         Pr(|T| > |t|) = 0.0027          Pr(T > t) = 0.9987
```

**Table 7: Chi-Square Test of Association between Gender and Discrete Explanatory Variables**

| **Explanatory Variables** | | | | |
|---|---|---|---|---|
| Income level 1 (poorest 20%) | | | | |
| Gender | Income level 1 (dummy) | | | Pearson $\chi^2$ |
| | 0 | 1 | Total | |
| Male | 83.2% | 16.8% | 100% | 1.5509 |
| Female | 86% | 14% | 100% | |
| Total | 84.9% | 15.1% | 100% | |
| **Income level 2 (second 20%)** | | | | |
| Gender | Income level 2 (dummy) | | | Pearson $\chi^2$ |
| | 0 | 1 | Total | |
| Male | 84.2% | 15.8% | 100% | 0.0670 |
| Female | 83.6% | 16.4% | 100% | |
| Total | 83.8% | 16.2% | 100% | |
| **Income level 3 (third 20%)** | | | | |
| Gender | Income level 3 (dummy) | | | Pearson $\chi^2$ |
| | 0 | 1 | Total | |
| Male | 83.9% | 16.1% | 100% | 0.5819 |
| Female | 82.1% | 17.9% | 100% | |
| Total | 82.8% | 17.2% | 100% | |
| Income level 4 (fourth 20%) | | | | |
| Gender | Income level 4 (dummy) | | | Pearson $\chi^2$ |
| | 0 | 1 | Total | |
| Male | 80.4% | 19.6% | 100% | 0.8959 |
| Female | 77.9% | 22.1% | 100% | |
| Total | 78.9% | 21.1% | 100% | |
| **Educational status of respondents** | | | | |
| Gender | Education (dummy) | | | |

| | Primary | Secondary | Total | Pearson $\chi^2$ |
|---|---|---|---|---|
| Male | 63.8% | 36.2% | 100% | 18.0810*** |
| Female | 76.3% | 23.7% | 100% | |
| Total | 71.3% | 28.7% | 100% | |
| **Employment status of respondents** | | | | |
| Gender | Employment (dummy) | | | Pearson $\chi^2$ |
| | Out of workforce | In workforce | | |
| Male | 10.6% | 89.4% | 100% | 54.1174*** |
| Female | 30.4% | 69.6% | 100% | |
| Total | 22.5% | 77.5 | 100% | |

**Table 8: Chi-Square Test of Association between Gender and Dependent Variables**

| Dependent Variables | | | | |
|---|---|---|---|---|
| **Formal Account** | | | | |
| Gender | Account (dummy) | | | Pearson $\chi^2$ |
| | 0 | 1 | Total | |
| Male | 47% | 53% | 100% | 25.9562*** |
| Female | 63.3% | 36.7% | 100% | |
| Total | 56.8% | 43.2% | 100% | |
| **Formal Savings** | | | | |
| Gender | Saving (dummy) | | | Pearson $\chi^2$ |
| | 0 | 1 | Total | |
| Male | 57.5% | 42.5% | 100% | 29.9102*** |
| Female | 74.1% | 25.9% | 100% | |
| Total | 67.5% | 32.5% | 100% | |
| **Formal Borrowing** | | | | |
| Gender | Borrowing (dummy) | | | Pearson $\chi^2$ |
| | 0 | 1 | Total | |
| Male | 54.5% | 45.5% | 100% | 9.5482*** |
| Female | 64.3% | 35.7% | 100% | |
| Total | 60.4% | 39.6% | 100% | |
| **Debit Card Holding** | | | | |
| Gender | Debit Card (dummy) | | | Pearson $\chi^2$ |
| | 0 | 1 | Total | |
| Male | 88.4% | 11.6% | 100% | 10.6190*** |
| Female | 94.2% | 5.8% | 100% | |
| Total | 91.9% | 8.1% | 100% | |
| **Possibility of coming up with emergency fund** | | | | |
| Gender | Emergency fund (dummy) | | | Pearson $\chi^2$ |
| | 0 | `1 | Total | |
| Male | 32.7% | 67.3% | 100% | 7.1408 *** |
| Female | 41% | 59% | 100% | |
| Total | 71.3% | 28.7% | 100% | |