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The female labor market and gender equality

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Abstract:

This paper is a cross-national panel study evaluating how education-, health- and political dimensions of gender equality are affected by the size and composition of the female labor market. The hypothesis is that improving labor force participation and female employment in the service sector have a positive relationship with the dimensions of gender equality. Gender equality is measured using three sub-indices from the Global Gender Gap Index by World Economic Forum. The sub-indices are; *Educational Attainment*, *Health and Survivability* and *Political Empowerment*. The hypothesis is tested by using both a time-averaged-Ordinary least squares regression and a fixed effects estimation. The results of this paper confirm that, on an international level, *service employment* is positive for *educational attainment*, but no evidence was found regarding *labor force participation*. The result also suggests that the effect of increasing *service employment* is positive with diminishing marginal returns. There are some evidence of *service employment* having a positive relationship with *health and survivability*, but no evidence for the *labor force participation*. No evidence of an effect on *political empowerment* from neither *labor force participation* nor *service employment* was found, but further research using better data or methods will be needed to conclude these results.

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1 Introduction

“Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world.” (United Nations, 2015).

The fact that gender equality is an important contributor to economic growth, reducing poverty and increasing democracy has been long known. In a paper by Eastin & Prakash (2013) they found that economic development and gender equality had a positive relationship. However, in their conclusion they encouraged further research to focus on how different sources of economic growth affect gender equality. When researching gender equality, three issues need be addressed. First, defining what gender equality is. Second, finding appropriate ways of measuring it. Third, is to find effective means of improving it. The Oxford Dictionary (n.d.) defines gender equality as “The state in which access to rights or opportunities is unaffected by gender.”. The measuring of gender equality is sometimes made by looking at female to male ratios, such as wages, school enrolment or political representation. (e.g. Eastin & Prakash, 2013). Another common approach is using indices consisting of several dimensions of gender equality; such as the Gender Development Index by the United Nations Development Program, or the Gender Gap Index by the World Economic Forum. In such indices, gaps in gender equality can be identified.

In the Gender Gap Report 2017, in which the Gender Gap Index is published, it is estimated that the gap between men and women won’t be closed for another 99 years if current pace of development is not accelerated (World Economic Forum, 2017). To increase gender equality, different approaches has been used. Increasing the school enrolment of girls and increasing the access to healthcare are, among others, advocated by the United Nations in their 17 Sustainable Development Goals of Agenda 2030 (United Nations, 2015). Several countries, e.g. Brazil, Indonesia and Kenya, has also introduced gender quotas in parliament (Dahlerup, Hilal, Kalandadze & Kandawasvika-Nhundu, 2013). Currently, most reforms towards gender equality is aimed at including women in the labor market, with giving access to credit being a close second (World Bank, 2018a). As of 2017, women only make up about 39.3 % of the world's total labor force, and in low and middle-income countries it is still a bit lower, at 38.3 %. These figures have barely changed at all since 1990, when the data was first collected at

this level (World Bank, 2018b). In support of this trend in reforms, some studies have found a relationship between different measures of gender equality and female labor force participation.

1.1 Research question and contribution

The research question of this paper is: *Does the size and composition of the female labor market affect educational-, health- and political dimensions of gender equality*? The dimensions are measured by using three sub-indices of the *Global Gender Gap Index* produced by World Economic Forum (2016); *Educational Attainment, Health and Survival and Political Empowerment.* The size of the female labor market is defined as the *female labor force participation rate,* and the composition of the female labor market is defined as employment in three labor market sectors; *service, agriculture and industry,* of which service sector employment will be compared to the others. To the best of our knowledge there has not been any prior study that specifically have researched the size and composition of the female labor market's connection to gender equality, this paper intends to provide a panel study analyzing this matter.

1.2 Structure

The rest of this paper goes as follows; the rest of section 1 consists of a literature review and further research. Section 2 present the theoretical framework, section 3 the data, section 4 the empirical strategy, section 5 the results and discussion, and section 6 the conclusion.

1.3 Literature review

Iversen & Rosenbluth (2005) studied how labor market structures affect gender norms, measured as men's partner preferences using survey data from Buss (1989). Partner preferences were measured as importance of virginity, cooking and housekeeping skills, and desire for home and children. They found a significant negative relationship between men's partner preferences and service sector. When the service sector grows, virginity, cooking and housekeeping skills, and desire for home and children all become less important. The explanation, according to the authors, is that the service sector demand female labor which in turn improves women's economic chances. Although closely related to this paper's research question, Iversen and Rosenbluth's (2005) study has some shortcomings. According to Buss

(1989), sampling techniques vary across countries, from interviews with high school students to newspaper advertisement and couples surveyed when applying for marriage licenses.

Jensen (2010) observed that increased labor market opportunities influenced marriage and fertility decisions of women. The study was conducted on randomly selected rural villages in India. The treatment group of villages were provided with recruitment services to help young women get hired by the emerging business process outsourcing industry. The author found an increase in employment and enrolment in post-school training courses, and a decrease in marriage and fertility for women aged 18-24. Both school enrolment and BMI (Body Mass Index) increased for school-aged girls. At the same time, no evidence of a change because of the treatment were found for school-aged boys or working-aged men. Munshi & Rosenzweig (2006) investigated how the rise of the service and software industries in India during the 1990s increased labor market opportunities for women previously outside of the labor market. Because of better returns on education in English, school-aged children's education in English rose. Among the lower castes, girls' English based education improved faster than for boys. They concluded that the reason for girls benefitting more in the lower castes was that they previously had not benefit from their caste-network in finding work, thus taking full advantage of the new situation by learning English. In another study by Iversen & Rosenbluth (2008) they studied the effect of increased female labor force participation on political representation. In some countries there was a strong correlation between increasing workforce participation and political representation, in other countries the correlation was much weaker, making the effect hard to distinguish. Their theory for the cause of this gender gap is that "when jobs require uninterrupted tenures, long hours, and inflexible schedules, women are at a distinct disadvantage" (Iversen & Rosenbluth, 2008, p. 493). Schwindt-Bayer (2018) proposed a different cause of the political gender gap, albeit when investigating female political representation particularly in Latin America. She states that the explanation for differences in political representation are due to institutional and political factors rather than cultural or socioeconomic factors.

When investigating the economic and educational aspects of gender equality, both Jensen (2010) and Munshi & Rosenzweig (2006) draws their conclusions from case studies in India. On the other hand, when trying to find explanations for female political representation,

Schwindt-Bayer (2018) solely focus on Latin American countries. These results have not been fully evaluated on an international level. Iversen & Rosenbluth (2006 & 2008) gave some indications, but especially due to the limitations of the sample in their 2006 study, further contributions to the international level is required.

1.4 Other important research

1.4.1 The link between economic development and gender equality and the impact of culture and religion

Eastin & Prakash (2013) found that GDP per capita had a cubic relationship with gender equality. Having higher levels of GDP per capita proved to increase gender equality but they also found that gender equality can stagnate or even decrease when GDP per capita is around $8 000-10 000. One explanation to why this is the case could be that, according to Inglehart, Norris & Welzel (2002), increasing GDP levels are likely to produce changes in the culture and an increasing democratization. They studied 65 countries from around the world, between 1980 and 1999, and found that gender equality is correlated with a country's level of democracy. Democratic countries tend to have a higher level of gender equality, although democratic institutions are not a guarantee for equality by themselves. Inglehart et al. (2002) also argue that democratic institutions could be seen as more of a consequence of a broader cultural change induced by economic growth. However, culture and norms change slowly. A study of the responses in three waves of the World Value Survey, Inglehart and Baker (2000) concludes that the historical religious heritage of a nation has been shaping some traditional values and norms that still persevere, regardless of the development. The development also seems dependent of the religious heritage; societies experience different outcomes from economic development partially due to religious heritage.

Considering these studies GDP per capita, each country's major religion and Freedom House's (2018a) measure for level of democracy and civil liberties are included in the analysis. Further motivation of these variables is presented in section 3.2.

1.4.2 How dependency of children and elders impact work opportunities

Breunig, Weiss, Yamauchi, Gong, and Mercante (2011) found a statistically significant relationship between reported difficulties with access to child care and women working less hours and having a less probability of working at all. In a paper about job equality for mothers, Frug (1979) described the situation as follows, “Child care has been an unacknowledged cost in our traditional economic policies, largely because women have provided these services free to the male wage earners.” (Frug, 1979, p. 101). In line with Breunig et al.’s (2011) conclusions, Frug (1979) too argues that one of the main actions to take, in order to make more mothers participate in the workforce, is to increase the availability of child care. This relationship is highlighted, although with different wording, by Kilic, Palacios-López and Goldstein (2015) when studying differences in gender specific productivity in agricultural work in Malawi; “The gender differences in returns to household size and child dependency ratio imply that the burden of childcare is more likely to reduce female agricultural productivity.” (Kilic, Palacios-López and Goldstein, 2015, p. 427) Sugawara & Nakamura (2014) studied how employment was affected by formal elderly care availability in Japan. They found that requirements to take care of elders had a negative relationship with the probability of women working regularly, and that non-regular workers more likely provided care themselves.

These findings motivate the inclusion of age dependency ratios in the analysis, the motivation is elaborated in section 3.2.

2 Theoretical framework

In this section, the theoretical framework of the paper is presented. The research question *Does the size and composition of the female labor market affect educational-, health- and political dimensions of gender equality?* comprises two separate parts, the effect of size and the effect of composition on the gender equality dimensions, and these two parts require separate hypotheses.

2.1 Size of the female labor market and inequality

In this paper, the size of the female labor market is defined as the percentage of women of working age (ages 15 to 64) that are employed outside the household, i.e. the *female labor force participation rate*. The main difference between being employed or not is the independent income received from employment. The independent income stream increases women's own economic power. The increased economic power changes the dynamic of the household. More specifically, the relative bargaining power between women and men is changed. Iversen & Rosenbluth (2005) state that bargaining power comes from the ability to credibly walk away from a deal. An independent income should enhance this ability to walk away, since it provides options not possible without an own income. Richards et al. (2013) suggest a link between female household bargaining power and health and nutrition of girls. Lack of bargaining power leads to women being unable to adequately access medicine or health services which affects the health of their children as well as their own.

The independent income is not only beneficial to the woman receiving it, but also to the household as the total income of the household increase. Rose (1999) found that girls mortality rates increased relative to boys during droughts in India, indicating that households favor boy's welfare when there is not enough to feed everyone. This suggest that improved economic conditions are expected to be more beneficial for girls than boys given that conditions where tough to begin with. Rose (1999) also found that the ability to save for bad times proved to reduce the gap in mortality between girls and boys during droughts. The same could be possible with schooling. For example, if a household has bad economic conditions and are faced with the decision to choose whether their son or daughter should attend school, they are more likely to choose their son if future labor market opportunities for women are much worse than for men. When economic conditions are better, they no longer have to face

this choice; and if labor market opportunities are equal, when faced with this choice, the likelihood of choosing their daughter is equal to that of their son.

The effect of the size of the female labor market on educational equality and health equality seem quite clear, and regarding political equality Blumberg (1984) suggests that increasing economic power for women in general may increase political equality through increasing female influence. Thanks to increasing economic power women gain more control over their lives and decisions, thus gaining influence in the household decision-making and subsequently also gaining influence on a societal level when women in general have more economic power. This societal increase in female economic power and influence may in turn have a positive effect on political equality.

Our prediction is that educational, health and political equality will increase when female labor force participation increase.

2.2 Composition of the female labor market and inequality

We define the composition of the female labor market as the *service*, *industry* and *agricultural* sector. The three sectors denote where women are employed in a country, as shares of the total number of employed women. For example, 20% of all women work in *service*, 10% in *industry* and 70% in *agriculture*; together making up all 100% of the employed women in the country.

The effects of increasing the female service sector, compared to the other sectors, will be the focus of this paper. Goldin (1995) states that as the female service sector grows, the opportunities of education for women increases as well. Furthermore, Eastin & Prakash (2013) suggest that the growth of the service sector should self-reinforce educational growth since the service sector allows for career advancement through education. Also, when countries develop economically, attitudes towards gender roles and equality shift. The most gains in gender equality happen when most of all workers are employed in the service sector, i.e. when the society is post-industrialized. (Inglehart & Norris, 2003).

When considering productivity then *service* employment, opposed to *agricultural*- and *industrial* employment, favors cognitive abilities over physical abilities. On average, men are physically stronger than women. Thus, assuming that productivity is at least one variable of

wage-setting, the gender wage gap should be smaller in the *service* sector compared to the other sectors, since the productivity advantage of being physically strong does not apply to that sector. Relative economic power for women is thereby better and gender equality improves through the same mechanisms discussed earlier, in section 2.1.

Our prediction is that educational, health and political equality will increase when the female *service* sector grows, and we expect *educational equality* to increase the most because of the self-reinforcing mechanism of *service* sector jobs.

3 Data

In this section, the sample is described, and the variables are presented.

3.1 Sample, main indicators and regressors

The sample consists of 84 low- and middle-income countries, defined as countries with a GNI per capita of $12 235 or below (World Bank Group 2018a). The countries in the sample still have a labor market with a larger share of agricultural and industrial jobs, as well as lower female labor force participation, than the average for high-income countries. Considering this, as well as the conclusions of previous research, drawn mainly from low- and middle-income countries, high-income countries are excluded from this paper. The full list of sample countries can be found in appendix A. Yearly averages for labor force participation and employment in service for the sample countries and high-income countries can be found in appendix B and C.

The data span a period of 11 years, from 2006 to 2016, the years when the Global Gender Gap Index has been produced. 2017 has been excluded due to the independent variables data for this year is solely projections.

The chosen indicators of gender equality are three of the sub-indices from the Global Gender Gap Index. The sub-indices included are: *Educational attainment*, *Health and survival*, and *Political empowerment*. In table 1 the indicators of each the three sub-indices are reported. The index is focusing on the gaps in differences in resources available for women and men. The scores of both the main index and the sub-indices does not depend on the actual levels of resources, instead it rewards or penalizes based on the gaps in access to those resources. The index is bound, with a lower bound of 0 and an upper bound of 1. With a score of 1, gender parity has been achieved, and a 0 implies total imparity. However, if women would supersede men, the score is still 1 and no penalty or reward is given. Worth noting is that the benchmark levels used for determining the gaps have not changed, making historical comparisons credible (World Economic Forum, 2016). The indices are scaled by 100 to obtain coefficients that are more easily interpreted.

Table 1 Sub-index indicators

Sub-index	Indicators
Educational Attainment	Ratio: female literacy rate over male value
	Ratio: female net primary enrolment rate over male value
	Ratio: female net secondary enrolment rate over male value
	Ratio: female gross tertiary enrolment ratio over male value
Health and Survival	Sex ratio at birth (converted to female-over-male ratio)
	Ratio: female healthy life expectancy over male value
Political Empowerment	Ratio: females with seats in parliament over male value
	Ratio: females at ministerial level over male value
	Ratio: number of years with a female head of state (last 50 years) over male value

Source: World Economic Forum, 2016

The sub-indices are calculated by using data from UNESCO Institute for Statistics; United Nations, Department of Economic and Social Affairs, Population Division; World Health Organization; the Inter-Parliamentary Union as well as using data from World Economic Forum's (2016) own database. The indicators of each sub-index are normalized by weighting the ratios by the 1% of the standard deviation of each indicator. By doing this, the indicators have the same relative impact on the score.

The main independent variables in the analysis are *female labor force participation (% of female population 15+)* and *female employment in service (% of female employment)*, both of which are collected from the World Development Indicators database (World Bank, 2018a). The variables are modelled with estimates by ILO, International Labor Organization (2010), who compute their estimates by using their "Trends Econometric Models". These models are used for imputing any missing data by running multivariate regressions for each country. According to the metadata from World Bank (2018b) ILO estimates are the best available for cross-country comparisons.

The ILO divide the entire labor market into the three sectors; service, industry and agriculture. This means that the women not employed in service, work in either industry or agriculture, in line with our theoretical framework. To capture the effect of employment in the service sector, we define the composition of the female labor force as the percent of employed women who work in each sector, rather than the percent of workers in the sector who are women. Consider a small country with ten thousand workers employed in the *service sector*,

of which one thousand are women, and the other sectors employing one thousand workers, of which five hundred are women. Thus, the country has a total of one thousand five hundred female workers. The *service sector* would have 10% women and the others 50% if they were measured as the percent of all workers in the different sectors who are women. If the sectors instead are measured as percent of employed women, the size of the female *service sector* is 66%, and the other sectors comprise of the remaining 33% of the female workforce. By using the first way of measuring the sectors, the percent of all workers who are women, we might be led to believe that having a large proportion of women, 50%, in the other sectors have an effect on gender equality, when instead it may be because the majority of employed women work in the service sector. With the latter way of measuring the female service sector, which gives 66%, we are be able to see if the fact that the majority of employed women are working in the service sector has an effect on gender equality, compared to the other sectors.

3.2 Control variables

GDP/capita is included as a control variable based on Eastin & Prakash's (2013) results. *GDP/capita, PPP (constant 2011 international $)* is collected from the World Development Indicators database (World Bank Group 2018a).

Additionally, in accordance with the findings of Inglehart, Norris & Welzel (2002), that democracy correlates with gender equality, *political rights* and *civil liberties* scores from the Freedom House democracy index (Freedom House, 2018a) are also included. This index is common to use in research papers in political science and economics (e.g. Barro, 1999). Both scores range from 1-7, where 1 represents the most free and 7 the least free (Freedom House, 2018b).

A set of indicator variables for the *major religions* were downloaded from ARDA, the Association of Religion Data Archives, website (Association of Religion Data Archives, 2011). The ARDA dataset derived from the 2008 Report on International Religious Freedom by The United States State Department (2008). The variables are included to control for the country-specific religious heritage which might affect the gender equality, in line with the conclusions of Inglehart and Baker (2000). The following changes have been made in the ARDA dataset; all Christian denominations ("Catholic", "Orthodox Christian" and "Other

Christian") have been merged to a single dummy variable, "Christian" [1]. Five countries were listed as "Other" of which three were the Hindu majority countries, Mauritius, Nepal and India. They have been assigned a separate dummy variable, "Hindu". The other two, Cameroon and Guyana, was marked as "Other" due to the population being divided into several of the Christian denominations used in the ARDA dataset, to clarify this, they were instead assigned to the "Christian" dummy variable. To avoid a dummy-variable trap (Gujarati & Porter, 2009), one variable, a reference group, has to be omitted, and the rest of the variables will be compared to that reference group. *Christian* is the reference group in our model.

Age dependency ratios for young and old will be included as proxies for the demand on working-aged household members to provide child- and elderly care. Generally, women are the ones taking care of dependents (i.e. children and elders) and thereby will have to work less or not at all (Breunig et al. 2011; Kilic, Palacios-López & Goldstein 2015). This makes it a likely covariate with labor force participation for women. The ratios are the quota between the dependents (young: < 15 years, old: > 64 years) and the working age population (15-64 years) (World Bank Group 2018a). The age dependency ratios are interpolations of data from 5-year intervals. These variables do not measure actual demand for care, but it is the closest proxy on a country level that could be found.

[1] None of the Christian denominations were significant when using them separately in the regressions.

Table 2 Variables

Variables	Variable name	Label
	CountryName	Country Name
	Year	
Dependent variables	EDU	Global Gender Gap Educational Attainment Sub-index
	HEA	Global Gender Gap Health and Survival Sub-index
	POL	Global Gender Gap Political Empowerment Sub-index
Main independent variables	LFP	Labor force participation rate, female (% of female population ages 15+)
	SER	Employment in service, female (% of female employment)
Control variables	GDPpcPPP	GDP per capita, PPP (constant 2011 international $)
	PR	Political rights
	CL	Civil liberties
	OADR	Age dependency ratio, old (% of working-age population)
	YADR	Age dependency ratio, young (% of working-age population)
	Christian	Christian
	Buddhist	Buddhist
	Hindu	Hindu
	Muslim	Muslim

3.3 Descriptive statistics and correlations

Table 3 contains summary statistics of the time-averages. The 75th percentile of *educational attainment* says that 25 % of the values in the sample are above 99.394. Hence, a lot of countries already has close to or equal *educational attainment*. *Health and survivability* does not ever reach 100 but most observations are close, with a sample time-average of 97.079 and a standard deviation of 1.097. *Political empowerment* has the lowest mean value of the three dependent variables and is the most unequal dimension of gender equality in this paper.
The sample mean of *labor force participation* is 52.093 %. For *service employment* the sample time-average is 53.729. Graphs showing the relationship between each index and *labor force participation* and *employment in service* are presented, with a time-averaged value for each country, in appendix D.

Table 3 Summary statistics

Variable	Observations	Mean	SD	Min	Max	P25	P75	P90	P95
Educational attainment	84	93.150	9.480	52.175	100.000	89.202	99.394	99.804	99.893
Health and survivability	84	97.079	1.097	93.441	97.976	96.769	97.913	97.967	97.967
Political empowerment	84	15.230	9.022	1.833	38.123	8.346	20.034	31.510	33.039
Labor force participation rate, female	84	52.093	16.474	13.218	85.565	43.848	62.834	75.289	80.567
Share of employment in service	84	53.729	24.074	3.309	95.418	33.305	72.409	84.073	86.936

Notes: The mean values are the sampled time-average. The sub-index values are expressed on a scale of 0 to 100 and the main independent variables as percentages. The 25^{th}, 75^{th}, 90^{th} and 95^{th} percentiles are shown.

The correlations of all variables except the religion dummies are presented in table 4. Service employment and GDP per capita (PPP adjusted) has a correlation of 0.64 which shows there is a connection between economic development and the *share of employment in service*. Other than that, there is relatively low correlations between the three dependent variables. This implies that there are almost no spillover effects between the indices.

Table 4 Correlations

	EDUSUB	HEASUB	POLSUB	LFP	SER	GDPpcPPP	PR	CL	OADR	YADR
EDU	1,00									
HEA	0,16	1,00								
POL	0,09	0,09	1,00							
LFP	-0,23	-0,03	-0,01	1,00						
SER	0,58	0,36	0,00	-0,36	1,00					
GDPpcPPP	0,54	0,16	-0,12	-0,32	0,64	1,00				
PR	-0,29	-0,25	-0,21	0,14	-0,38	-0,20	1,00			
CL	-0,32	-0,26	-0,20	0,12	-0,39	-0,23	0,89	1,00		
OADR	0,41	0,04	-0,04	-0,20	0,30	0,57	-0,20	-0,25	1,00	
YADR	-0,71	0,02	0,06	0,40	-0,50	-0,70	0,18	0,21	-0,72	1,00

Note: Pearson correlation. Religions not included since they are dummy-variables.

4 Empirical strategy

In this section, the methods of analyzing are presented, along with the assumptions made and the advantages and disadvantages of our methods. This is followed by a section on how we intend to apply the methods to our dataset.

4.1 Ordinary Least Squares regression

To investigate the correlations between our dependent and independent variables, Ordinary Least Squares (OLS) regressions are carried out to find significance levels and marginal effects. These are made with the time-averaged data in two steps, first without any controls, and then with control variables to check the robustness of the estimates. The threshold of significant used is 5% (α=0.05).

Model specification:

$$\bar{Y}_i = \beta_0 + \beta_1 \bar{X}_i + \beta_2 \bar{Z}_i + \varepsilon_{it}$$

$\bar{Y}_i$ is a vector containing the time-average of each dependent variable. $\bar{X}_i$ contains the time-averages of the independent variables and $\bar{Z}_i$ of the control variables. ε_{it} is the unobserved factor and is assumed to be standard normally distributed.

Time-averages are useful to exclude short term fluctuations in the regressors and the dependent variables due to exogenous shocks such as boom-bust cycles or minor health epidemics. The main drawback in our case is that it would be susceptible to inconsistency because this method does not allow controlling for causes of country-specific unobserved heterogeneity. One variable, religious heritage is controlled for, but others, such as cultural differences or geographical characteristics are regarded as omitted variables that could cause inconsistencies when estimating the coefficients. For example, a country with suitable land for agriculture would naturally have a larger share of employment in that sector or cultural characteristics that promote women not working. Geography is regarded a time-invariant omitted variable. This is the case for culture as well, based on the conclusion of Inglehart et al. (2002) that cultures change slowly.

4.2 Panel regression using the fixed effects estimator

To control for the time-invariant omitted variables, while still capturing the panel structure of the data, the fixed effects estimator is used. The fixed-effect estimation can be used since it allows for correlation between time-invariable omitted variables and the regressors.

4.2.1 Basic assumptions

First assumption: The error term (ε_{it}) should not be correlated with the regressors across all time periods for the fixed effects estimator to be unbiased. Correlation between the time constant variables and the regressors are allowed.
Second assumption: Time-invariant variables cannot be included in the model because they become 0 in the fixed effects transformation (violation of the full rank assumption).
Third assumption: The errors (ε_{it}) are required to be homoscedastic and serially uncorrelated.

The *first assumption* is the basis for why the time-variant control variables are included. In order not to violate the *second assumption*, the religion control variables will not be included since they have time-invariant values. To account for violation of the *third assumption*, robust standard errors clustered within each country are used. The reason to believe this assumption is violated is because the data for *educational attainment* and *health and survivability* are close to its bound of 100, the variance will become lower as the index approaches 100 (see Section 5.1, table 3 and figures 1-2 for further illustration of this matter). Clustering the standard errors within each country allows for serial correlation within a country (Hoechle, 2007), of which there is likely correlation. Using clustered standard errors can thereby relax the *third assumption* to only require uncorrelated errors between countries.

4.2.2 Simple model specification

To obtain the fixed effects estimator, the time-averaged value is subtracted from the individual value, making it the *mean corrected value*. (Gujarati & Porter 2009). A consequence of using the *mean corrected values* is that time-invariant variables are cancelled out.

Model specification:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + \alpha_{it} + \varepsilon_{it}$$

Y_{it} is a vector consisting of our three dependent variables, X_{it} contains the main independent variables and Z_{it} the control variables, and α_{it} is the unobserved time-invariant variables. The error term, ε_{it}, is assumed to be standard normally distributed.

Mean corrected model:

$$(Y_{it} - \bar{Y}_i) = \beta_0 + \beta_1 (X_{it} - \bar{X}_i) + \beta_2 (Z_{it} - \bar{Z}_i) + (\alpha_{it} - \bar{\alpha}_i) + (\varepsilon_{it} - \bar{\varepsilon}_i)$$

$$\alpha_{it} = \bar{\alpha}_i \leftrightarrow \alpha_i - \bar{\alpha}_{it} = 0$$

$$(Y_{it} - \bar{Y}_i) = \beta_0 + \beta_1 (X_{it} - \bar{X}_i) + \beta_2 (Z_{it} - \bar{Z}_i) + (\varepsilon_{it} - \bar{\varepsilon}_i)$$

Since the time-invariant variable, α_{it}, is constant over time, the mean equals the constant and the *mean corrected value* becomes 0. However, potential time-variant covariates still must be accounted for to avoid omitted variables bias. Therefore, all control variables of the fixed effects model are time-variant as the *second assumption* states.

4.2.3 Disadvantages of estimating fixed effects

It is advantageous to be able to disregard time-invariant variables when omitted variables such as culture or geographical traits could cause inconsistencies. However, at same time this means that some variation is removed, which could be a risk if the remaining variation is very low. Another consequence of the fixed effects estimation is that the long run components of that variable is removed (Asteriou & Hall 2007). This may be a problem if it takes more than one year for the real effects kick in. On the other hand, Jensen (2010) found improvements in gender equality in a study conducted over three years – which indicates that the effect is short- to mid-term and not long run. Therefore, a regression that includes our main independent variables with a lag of one year will be estimated to see if the effects labor force participation or sector employment are delayed. The fixed effects combined with the lagged variables may also weaken any objections regarding contemporary reverse causality, since it

is hard to argue that changes in the previous time period are caused by changes in the current time period.

The World Bank (2018b) database does not contain data for all variables for all time units, a few countries do not have sub-index scores for each year due to data availability, and others lack some data for one of the control variables, this results in an unbalanced panel. Countries with missing values for all years is excluded from the analysis, while allowing countries with just a few missing observations to remain. This makes the panels highly- but not perfectly balanced. However, the fact that the panel is unbalanced does not necessarily become a problem, the important question is why the panel is unbalanced. If the reasons for the variables going missing are not related to the error term, ε_{it} i.e. unknown factors affecting gender equality sub-indices, the estimators will not be biased (Wooldridge, 2013).

4.3 Testing the hypothesis

Each dimension of gender equality will have its own regression. Thus, for each step of the analysis, three regressions are reported. The expected results according to the theoretical framework are the following:

- The coefficient for labor force participation is positive for all dimensions of gender equality.
- The coefficient for service employment is positive for all dimensions of gender equality; and the coefficient is larger for educational equality than the other indices.

Service employment is the only sector variable added out of the three. *Service employment* is highly correlated with *industry* (r = -0.53) and almost perfectly correlated with *agriculture* (r = -0.96). Since the literature and our theoretical framework discuss the positive relationship between *service employment* and gender equality this is the only sector variable that will be used in the analysis.

Also, interaction effects are added between *labor force participation* and *service employment* to see if the total effect on gender equality depends on the level of the interacted variables. By using interaction effects, the answer to the research question could be more nuanced, since the size and composition are not just evaluated as entities but also as combinations. The interaction variables are added in the same stage as the control variables are. To ensure the

model has a proper functional fit quadratic effect of the main independent variable will also be checked for in this stage of analysis.

The emphasis in this paper will be put on the results of the fixed effects estimation since we believe it should provide the most consistent results. The main support for this statement is that fixed effects control for all time-invariant omitted variables, and that the hypothesis is to test time-variant variables effect on gender equality.

5 Results

In this section, the results of the two methods are presented. Both are presented first without control variables and then with control variables added, to check the robustness.

5.1 Time-averaged OLS

In table 5 the time-averaged OLS-regressions without controls are presented. *Labor force participation* is not significant in any of the regressions. *Service employment* is significant and positive for the regressions on *Educational attainment* and *Health and survivability.* The interpretation is that if *service employment* increase by one percentage of female employment, then *Educational attainment* is increased by 0.231 points, and in the case of *Health and survivability*, the increase is 0.020 points. The effect on *Educational attainment* is more than 11 times larger than the effect on *Health and survivability*. None of the variables are significant on *Political empowerment.*

Table 3 Time-averaged-OLS-regression, no control variables

	(1)	(2)	(3)
	Time-averaged OLS	Time-averaged OLS	Time-averaged OLS
VARIABLES	EDU	HEA	POL
LFP	-0.007	0.007	0.017
	(0.056)	(0.007)	(0.067)
SER	0.231***	0.020***	0.001
	(0.038)	(0.005)	(0.045)
Constant	81.143***	95.644***	14.277***
	(4.298)	(0.565)	(5.075)
Observations	865	865	865
R-squared	0.351	0.163	0.001
Number of countries	84	84	84

Standard errors in parentheses. The standard errors are clustered by country.
*** p<0.01, ** p<0.05, * p<0.1

In table 6 the time-averaged OLS-regressions with controls are presented. *Service employment* remains significant and positive on *Educational attainment* and *Health and survivability*. The coefficients are somewhat larger than without the controls, but the ratio between them are roughly the same. Neither *labor force participation* nor *service employment* are significant on

Political empowerment. Quadratic effects were also tested for but yielded no significant result. See appendix E for the result.

Labor force participation is significant and positive on *Educational attainment.* Also, the interaction effect between *service employment* and *labor force participation* is significant. The following conclusions can be drawn about the total effect of *labor force participation* and *service employment*:

- The positive effect of increasing *labor force participation* is less positive if *service employment* is high than if *service employment* is low.
- The positive effect of increasing *service employment* is less positive if *labor force participation* is high than if *labor force participation* is low.

Table 4 Time-averaged-OLS-regression, with control variables

VARIABLES	(1) Time-averaged OLS EDU	(2) Time-averaged OLS HEA	(3) Time-averaged OLS POL
LFP	0.218**	0.002	-0.184
	(0.083)	(0.016)	(0.141)
SER	0.266***	0.034**	-0.112
	(0.082)	(0.016)	(0.139)
c.LFP#c.SER	-0.005***	-0.000	0.001
	(0.002)	(0.000)	(0.003)
GDPpcPPP	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
PR	-1.213	-0.118	-0.196
	(0.968)	(0.185)	(1.632)
CL	0.762	0.055	-1.162
	(1.292)	(0.247)	(2.179)
OADR	-0.775***	0.030	-0.121
	(0.184)	(0.035)	(0.310)
YADR	-0.459***	0.028**	0.018
	(0.056)	(0.011)	(0.095)
Buddhist	-6.369**	0.464	-1.541
	(2.706)	(0.517)	(4.561)
Hindu	-12.846***	-0.952	0.040
	(3.431)	(0.655)	(5.783)
Muslim	-7.495***	-0.669*	-7.178**
	(1.826)	(0.349)	(3.078)
Constant	117.293***	94.474***	36.626***
	(7.127)	(1.361)	(12.013)
Observations	845	845	845
R-squared	0.756	0.336	0.190
Number of countries	82	82	82

Standard errors in parentheses. The standard errors are clustered by country.
*** p<0.01, ** p<0.05, * p<0.1

5.2 Fixed effects

Table 7 contains the results of the fixed-effects estimation without the control variables. *Labor force participation* is not significant in either of the regressions. *Service employment* is significant and positive on both *Educational attainment* and *Political empowerment.* The interpretation of the coefficients changes when estimating the fixed effects. Instead, the coefficients are now interpreted as follows; If *service employment* increase by one percentage past its time-average then *Educational attainment* increase by 0.114 points, and in the case of *Political empowerment*, the increase is 0.280 points.

Table 5 Panel regression with fixed effects, no control variables

	(1)	(2)	(3)
	Fixed effects	Fixed effects	Fixed effects
VARIABLES	EDU	HEA	POL
LFP	0.083	0.022	-0.159
	(0.103)	(0.029)	(0.200)
SER	0.114***	0.014	0.280***
	(0.037)	(0.011)	(0.103)
Constant	82.661***	95.172***	8.388
	(5.829)	(1.662)	(11.455)
Observations	865	865	865
R-squared	0.037	0.015	0.042
Number of countries	84	84	84

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The control variables are added to the fixed effects estimation and presented in table 8. *Service employment* has now lost its significance on *Political empowerment*. The *Health and survivability* regression remains as in table 7, with no significant main variables. The interaction effects are not significant in the fixed effects model. The use of lagged main independent variables, in case of delayed effects, yielded no notable differences. The table for the model with lagged variables is included in appendix F.

A quadratic relationship between *service employment* and *Educational attainment* is found when the controls are added. The effect is positive and diminishing as *service employment*

increase. The total effect of *service employment* turns negative when *service employment* is 98 percentages past its time-average.

Table 6 Panel regression with fixed effects, with control variables

	(1)	(2)	(3)
	Fixed effects	Fixed effects	Fixed effects
VARIABLES	EDU	HEA	POL
LFP	0.302	0.051	-0.249
	(0.194)	(0.055)	(0.313)
SER	0.784***	0.042	0.117
	(0.238)	(0.043)	(0.318)
SER2	-0.004***	-0.000	-0.002
	(0.001)	(0.000)	(0.003)
c.LFP#c.SER	-0.005*	-0.001	-0.001
	(0.003)	(0.001)	(0.005)
GDPpcPPP	0.000	0.000	0.001*
	(0.000)	(0.000)	(0.000)
PR	-0.036	-0.066	-0.067
	(0.255)	(0.054)	(0.434)
CL	0.294	-0.033	0.194
	(0.304)	(0.105)	(0.857)
OADR	-0.418*	-0.118*	-0.179
	(0.232)	(0.068)	(0.743)
YADR	-0.267***	-0.020	-0.561***
	(0.074)	(0.014)	(0.161)
Constant	78.116***	95.837***	50.942**
	(13.967)	(3.329)	(23.332)
Observations	845	845	845
R-squared	0.212	0.043	0.168
Number of countries	82	82	82

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.3 Discussion

5.3.1 Interpretation of the results

Regarding the first part of the research question, the size of the labor market, positive significant relationships between *labor force participation* and *educational attainment* were found in the time-averaged OLS. Also, the interaction effect was significant and because of that the level of *service employment* affects how large the effect of increasing *labor force participation* is going to be and vice versa. Other than that, no evidence suggests a relationship between neither *labor force participation* and *health and survivability* nor *labor force participation* and *political empowerment.*

Once the fixed effects were estimated no significance between *labor force participation* and *education attainment* was found. The reason why could be that there is some omitted time-invariant variable that affect both *labor force participation* and *educational attainment* positively. When this variable is removed because of the fixed effects, then the relationship between these variables also disappears because there is no direct connection between *labor force participation* and *educational attainment*. One variable that could explain this is attitudes toward gender roles. If the society has positive attitudes on women working, then society probably has the same attitude to women educating. As in the time-averaged OLS, no significant coefficients on the other indices was found in the fixed effects estimation which further indicates no relationship between *labor force participation* and the health and political dimension of gender equality.

Continuing with the second part of the research question, the composition of the labor market. Significant positive coefficients of *service employment* on *educational attainment* and *service employment* on *health and survivability* were found. *Service employment* has a larger effect on *educational attainment* than on *health and survivability* when *labor force participation* is at a low level. If *labor force participation* is higher, then the total effect of *service employment* on *educational attainment* is lower because of the interaction effect. At 53.2 % *labor force participation* the marginal effect is 0 it becomes negative as *labor force participation* surpasses 53.2 %.

According to the fixed effects estimation, increasing *service employment* is most effective when it is starting to increase past its time-average, or if it is lower than its time-average. The interaction effect is no longer significant in the fixed effects estimation. Instead, the fixed effects estimation shows a quadratic relationship between *service employment* and *educational attainment*. The sample time-average for *service employment* is 53.729 % (table 4). When *service employment* makes up 63.729 % (i.e. an increase of 10 percentages past the time-average) the marginal effects is 0.704 and at 83.729 % (i.e. an increase of 30 percentages past the time-average) the marginal effects is 0.544 and still considered to have a significant impact. *Education attainment* reaches a score of 100 when the share of service employment is 87.658 % for the entire sample. These results are in line with our prediction, that educational opportunities increase as the service sector grows. The same positive relationship was also found in the research by Jensen (2010) and Munshi & Rosenzweig (2006). The marginally diminishing property of increasing the share of female employment in the service sector has not been brought up in previous literature. One explanation could be that with low initial levels of service sector employment, increases in the employment rate might spur literacy rates as well as primary- and secondary school enrolment due to educational requirements in the service sector, and also because the improved economic conditions makes it possible for parents to invest in their daughters. Later, when the service sector is more prominent, most women have primary and secondary schooling. Thus, the only remaining inequality is in tertiary education. Tertiary education may have more resistance due to higher costs of education and patriarchal norms in academia which leads to diminishing returns of increasing *female service employment*.

From the fixed effects analysis, the conclusion is that if an individual country increases its *service employment* relative its own time-average, then the *educational attainment* index of that country is expected to increase relative to its time-average. Not to be confused with the interpretation of the time-averaged-OLS, where the interpretation is that if the time-averaged share of service employment increase, then the time-averaged score of *educational attainment* is expected to increase. The results aren't comparable directly but since the fixed effects estimation is able to control for all time-invariant omitted variables; and *service employment* still held its significance on *educational attainment*, even when using a 1-year lag, this is the most reliable result of the analysis.

When the fixed effect where estimated, most coefficients lost its significance, indicating that some time-invariant omitted variable is the root cause of gender inequalities. Other scholars (Blackburn & Jarman, 2006; Oppenheimer, 1970) have argued institutional gender bias affect which type of positions that women entering the workforce end up in. If the positions available reflect the current gender inequalities, then neither female labor force participation, nor service employment, will have any effect on gender equality. Even if *service employment* has positive effects on gender equality in theory, it is not viable since women may end up in lower positions due to current gender bias.

For *political empowerment* neither model yielded any significant results apart from the fixed effects without controls, but it proved not robust when the controls were added. The *health and survivability* index, before estimating the fixed effects, had significant coefficients for *service employment*. This suggests that either the low variation of *health and survivability* isn't sufficient to estimate the fixed effects, or that some time-invariant variable is omitted. We treat the results regarding *political empowerment* as more reliable than *health and survivability* since the same dilemma, low variation versus omitted variable, is not suspected in that model. However, the results of the time-averaged-OLS suggest that the effects on *health and survivability* are marginally small and are regarded as not relevant to induce changes in the sub-index.

5.3.2 Limitations

The results may be affected to a large extent by the characteristics of the indices. The indices are continuous but are bound by 0 and 1 (0 and 100 after the transformation). While the *political empowerment* is not close any of the limits and can be viewed as completely continuous, some observations are in fact close to or equal to the upper limit for *educational attainment* and *health and survivability*. The OLS-estimation could then predict values that are technically impossible to attain. Also, the OLS-estimation could potentially miss out on valuable information by not being able to detect if there are some threshold where increasing employment simply doesn't lead to higher equality. While a quadratic term may provide a good fit, it is not certain that is works well enough. This also causes problems when estimating the variance. When a country already has full equality, the index can't increase

further and will stay at 100. This could be worrying for the significant coefficient of *service employment* on *educational attainment*. Most values of *educational attainment* are close to or equal to 100, indicated by the 75th percentile being 99.394 points and the 90th being 99.804 points (table 3). As the fitted line approaches 100 the variance becomes lower and lower because the observed values are bound by 100 making the variance lower due to the upper limit of the sub-index. The low variance could cause the standard error to be very small, even when using heterogeneity robust standard errors, and the significance test in turn isn't reliable.

Apart from limitations with the analysis, there are also general limitations with the sampled data and the interpretation. The most accurate conclusion about the research question would require a world of perfect information, with quantifiable household data. This is, naturally, not the case and this thesis is based on data consisting of estimates and country-level aggregates. Since the indices consist of ratios, any changes in those ratios might be due to, in absolute terms, worsening conditions for men instead of improving conditions for women. These ratios are in turn based on data collected mostly via surveys and censuses. This is also the case for our independent variables of interest, *female labor force participation* and *female employment in service*. This makes this data susceptible to measurement errors and different survey standards among the countries in the sample. Such differences are for example upper and lower bounds of age groups to include in the survey, or which reference period being used. Another lacking element of the data is the non-existence of reliable indicators of country specific policies, cultures and customs, all of which aren't included in the indices. Also, the fact that we cannot be certain that the missing data is not correlated with any unobservable factors in turn affecting the gender equality indices, we cannot know if our coefficients are completely unbiased.

6 Conclusion

From the research question, "*Does the size and composition of the female labor market affect educational-, health- and political dimensions of gender equality*?", this paper has presented some evidence. Most of the results suggest no evidence for a connection between the size of the female labor market and gender equality. The one finding this paper provides is from the time-averaged OLS and is between *labor force participation* and the *educational attainment* index. Since the fixed effects estimation did not show the same relationship we have reason to believe that some time-invariant variable affected both *labor force participation* and the *educational attainment* index, resulting in a false positive relationship. Attitudes towards gender roles could explain this result, but it would have to be researched further to make any certain conclusions.

A significant positive relationship between the share of female employment in service and educational where found, confirming both previous results from India (Jensen, 2010; Munshi & Rosenzweig, 2006) using 84 low- and middle-income countries. In retrospect, this finding was the most probable considering the amount of previous research done. That the significant effect is not only positive but has a diminishing marginal return has not previously been found to our knowledge. Labor market policy focusing on increasing female service employment is the most effective in countries where the share of service employment is low. When service employment already is at a high level, then increasing it further would yield smaller improvements though the marginal effect can be shown not to diminish so quickly; and policy is still regarded as effective. Some indications about health equality where given in the time-averaged-OLS; seeing improvements when service employment increased. The effects where minor compared to the effects on *Educational attainment*, and if even if the time-averaged-OLS is viewed as reliable, intervention in this area would yield insignificant changes to health and survivability. From the beginning of analysis, the political empowerment sub-index showed no indication of being dependent on the female labor market. Compared to the health and survivability sub-index, it is more likely that this result is reliable and not dependent on any mis-specified models. Thus, this study provides no evidence that supports labor market policy having any effect on political empowerment.

The most worrying limitation of the analysis is due to the indices being bound by 0 and 100. Further research should focus on either finding a better measurement of gender equality or exploring if methods using a different functional form better fitting to the indices to confirm if the results of this paper are in fact correct and not caused by this flaw.

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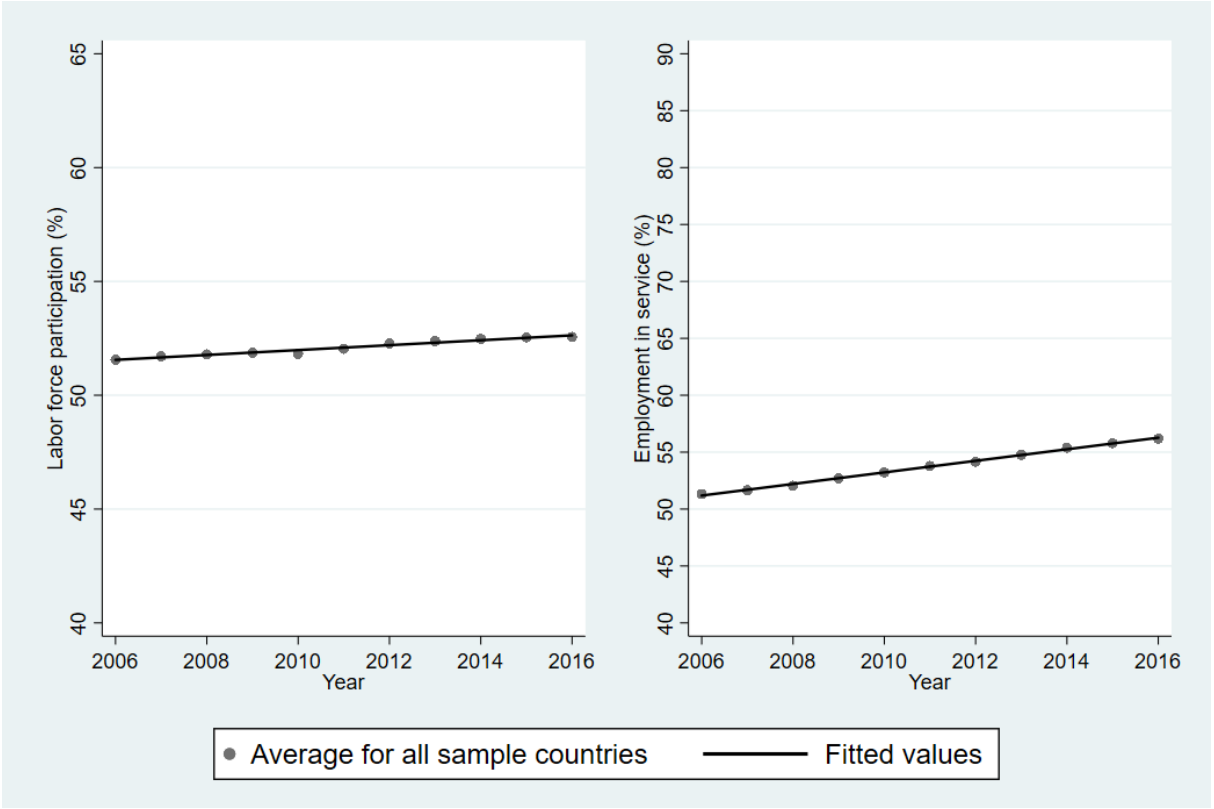
Appendix A: Sample countries

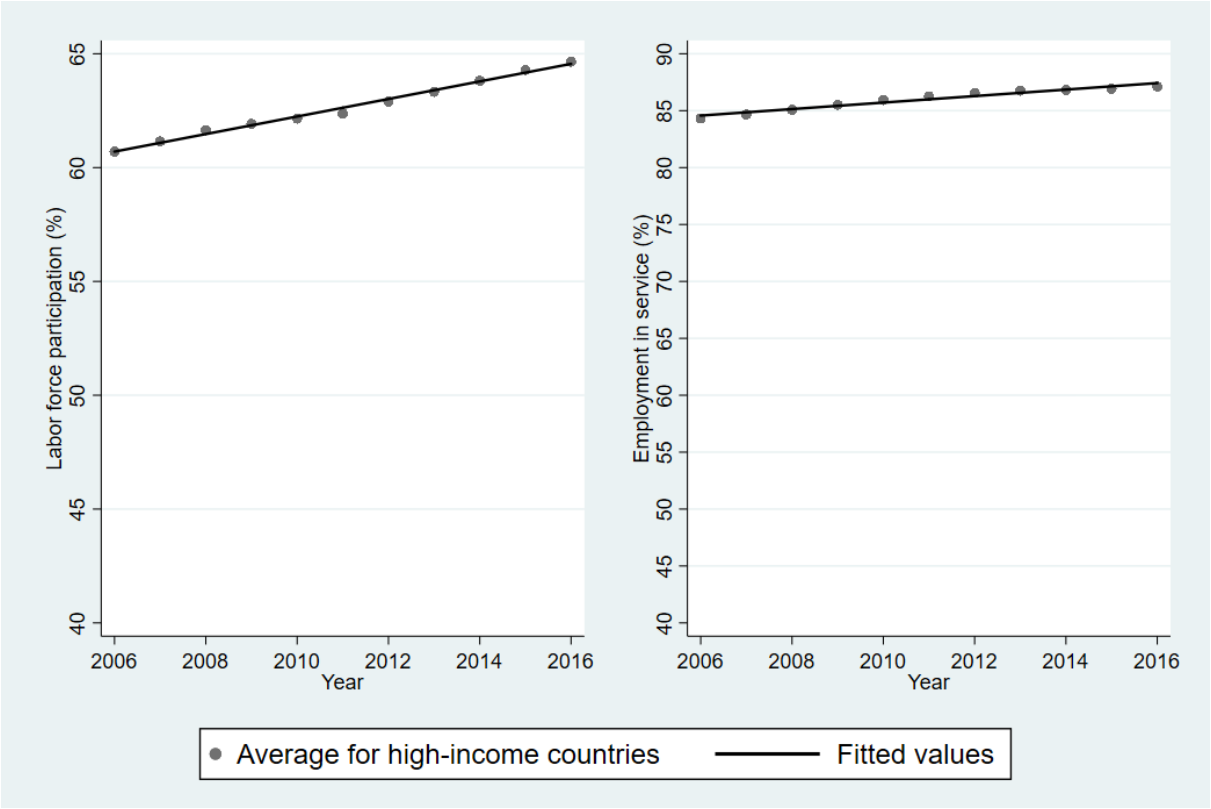
Country	Income Group	Region	Major religion
Albania	Upper middle income	Europe & Central Asia	Muslim
Algeria	Upper middle income	Middle East & North Africa	Muslim
Angola	Lower middle income	Sub-Saharan Africa	Christian
Argentina	Upper middle income	Latin America & Caribbean	Christian
Armenia	Lower middle income	Europe & Central Asia	Christian
Azerbaijan	Upper middle income	Europe & Central Asia	Muslim
Bangladesh	Lower middle income	South Asia	Muslim
Belarus	Upper middle income	Europe & Central Asia	Christian
Belize	Upper middle income	Latin America & Caribbean	Christian
Benin	Low income	Sub-Saharan Africa	Christian
Bolivia	Lower middle income	Latin America & Caribbean	Christian
Botswana	Upper middle income	Sub-Saharan Africa	Christian
Brazil	Upper middle income	Latin America & Caribbean	Christian
Bulgaria	Upper middle income	Europe & Central Asia	Christian
Burkina Faso	Low income	Sub-Saharan Africa	Muslim
Burundi	Low income	Sub-Saharan Africa	Christian
Cabo Verde	Lower middle income	Sub-Saharan Africa	Christian
Cambodia	Lower middle income	East Asia & Pacific	Buddhist
Cameroon	Lower middle income	Sub-Saharan Africa	Christian
Chad	Low income	Sub-Saharan Africa	Muslim
China	Upper middle income	East Asia & Pacific	Buddhist
Colombia	Upper middle income	Latin America & Caribbean	Christian
Costa Rica	Upper middle income	Latin America & Caribbean	Christian
Côte d'Ivoire	Lower middle income	Sub-Saharan Africa	Christian
Croatia	Upper middle income	Europe & Central Asia	Christian
Cuba	Upper middle income	Latin America & Caribbean	Christian
Dominican Republic	Upper middle income	Latin America & Caribbean	Christian
Ecuador	Upper middle income	Latin America & Caribbean	Christian
El Salvador	Lower middle income	Latin America & Caribbean	Christian
Ethiopia	Low income	Sub-Saharan Africa	Muslim
Fiji	Upper middle income	East Asia & Pacific	Christian
Georgia	Lower middle income	Europe & Central Asia	Christian
Ghana	Lower middle income	Sub-Saharan Africa	Christian
Guatemala	Lower middle income	Latin America & Caribbean	Christian
Guyana	Upper middle income	Latin America & Caribbean	Christian
Honduras	Lower middle income	Latin America & Caribbean	Christian
India	Lower middle income	South Asia	Hindu
Indonesia	Lower middle income	East Asia & Pacific	Muslim
Jamaica	Upper middle income	Latin America & Caribbean	Christian
Jordan	Lower middle income	Middle East & North Africa	Muslim

Kazakhstan	Upper middle income	Europe & Central Asia	Christian
Kenya	Lower middle income	Sub-Saharan Africa	Christian
Kyrgyz Republic	Lower middle income	Europe & Central Asia	Muslim
Lebanon	Upper middle income	Middle East & North Africa	Muslim
Lesotho	Lower middle income	Sub-Saharan Africa	Christian
Madagascar	Low income	Sub-Saharan Africa	Christian
Malawi	Low income	Sub-Saharan Africa	Christian
Malaysia	Upper middle income	East Asia & Pacific	Muslim
Maldives	Upper middle income	South Asia	Muslim
Mali	Low income	Sub-Saharan Africa	Muslim
Mauritania	Lower middle income	Sub-Saharan Africa	Muslim
Mauritius	Upper middle income	Sub-Saharan Africa	Hindu
Mexico	Upper middle income	Latin America & Caribbean	Christian
Moldova	Lower middle income	Europe & Central Asia	Christian
Mongolia	Lower middle income	East Asia & Pacific	Buddhist
Morocco	Lower middle income	Middle East & North Africa	Muslim
Mozambique	Low income	Sub-Saharan Africa	Christian
Namibia	Upper middle income	Sub-Saharan Africa	Christian
Nepal	Low income	South Asia	Hindu
Nicaragua	Lower middle income	Latin America & Caribbean	Christian
Nigeria	Lower middle income	Sub-Saharan Africa	Muslim
Pakistan	Lower middle income	South Asia	Muslim
Panama	Upper middle income	Latin America & Caribbean	Christian
Paraguay	Upper middle income	Latin America & Caribbean	Christian
Peru	Upper middle income	Latin America & Caribbean	Christian
Philippines	Lower middle income	East Asia & Pacific	Christian
Romania	Upper middle income	Europe & Central Asia	Christian
Russian Federation	Upper middle income	Europe & Central Asia	Christian
Senegal	Low income	Sub-Saharan Africa	Muslim
Serbia	Upper middle income	Europe & Central Asia	Christian
South Africa	Upper middle income	Sub-Saharan Africa	Christian
Sri Lanka	Lower middle income	South Asia	Buddhist
Suriname	Upper middle income	Latin America & Caribbean	Christian
Syrian Arab Republic	Lower middle income	Middle East & North Africa	Muslim
Tajikistan	Lower middle income	Europe & Central Asia	Muslim
Tanzania	Low income	Sub-Saharan Africa	Christian
Thailand	Upper middle income	East Asia & Pacific	Buddhist
Tunisia	Lower middle income	Middle East & North Africa	Muslim
Turkey	Upper middle income	Europe & Central Asia	Muslim
Uganda	Low income	Sub-Saharan Africa	Christian
Ukraine	Lower middle income	Europe & Central Asia	Christian
Vietnam	Lower middle income	East Asia & Pacific	Buddhist
Zambia	Lower middle income	Sub-Saharan Africa	Christian
Zimbabwe	Low income	Sub-Saharan Africa	Christian

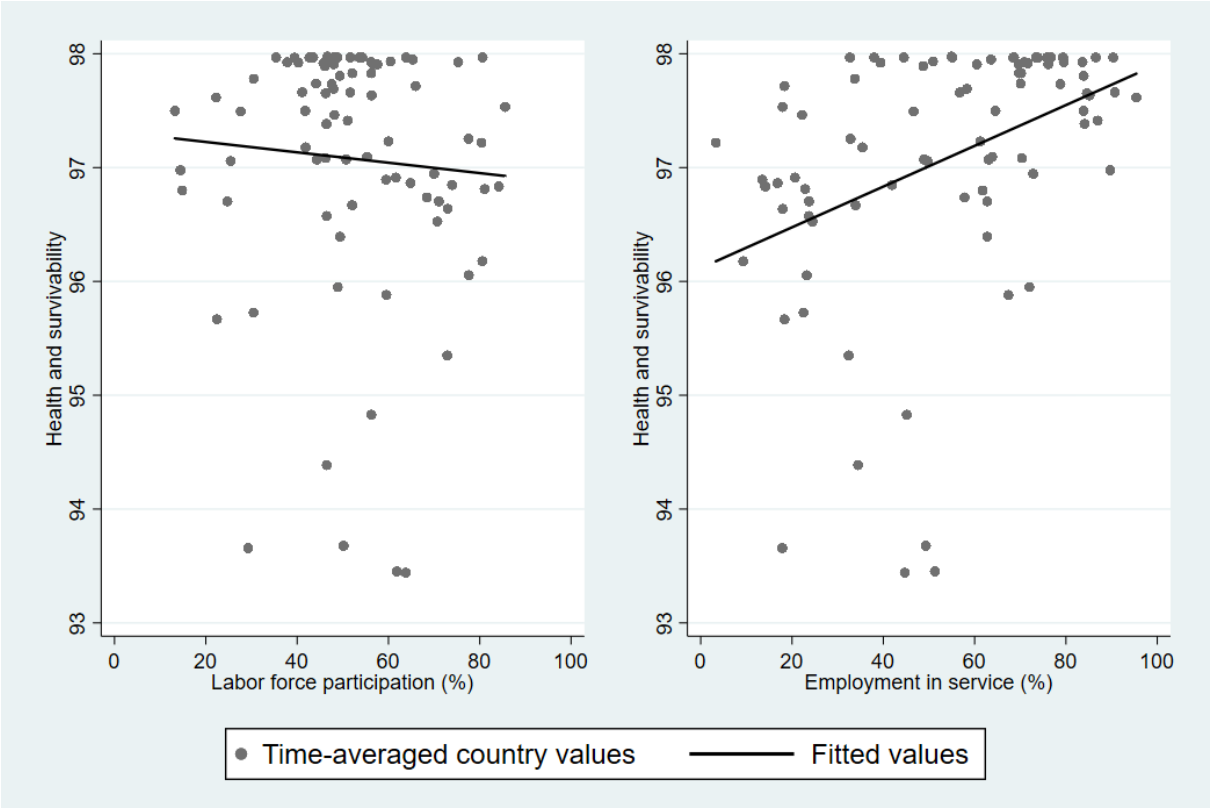
Appendix B: Average values for labor force participation and employment in service, sample countries

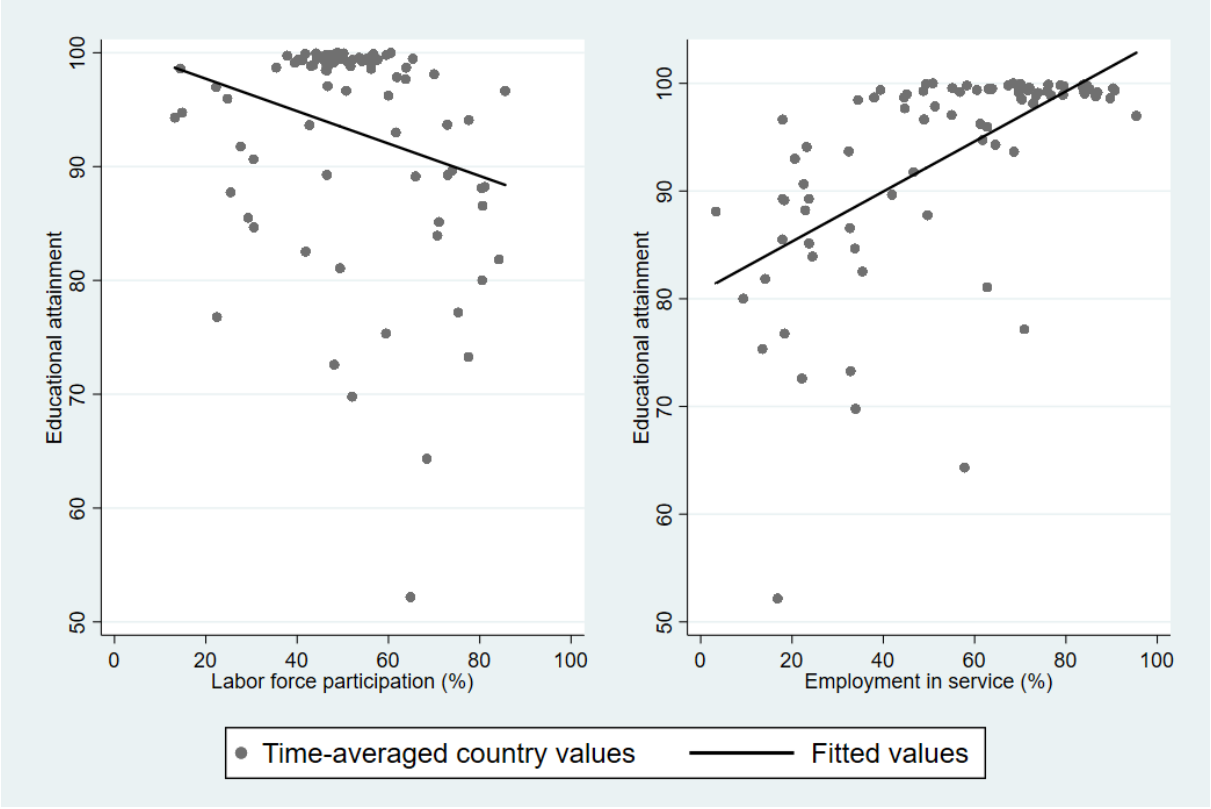


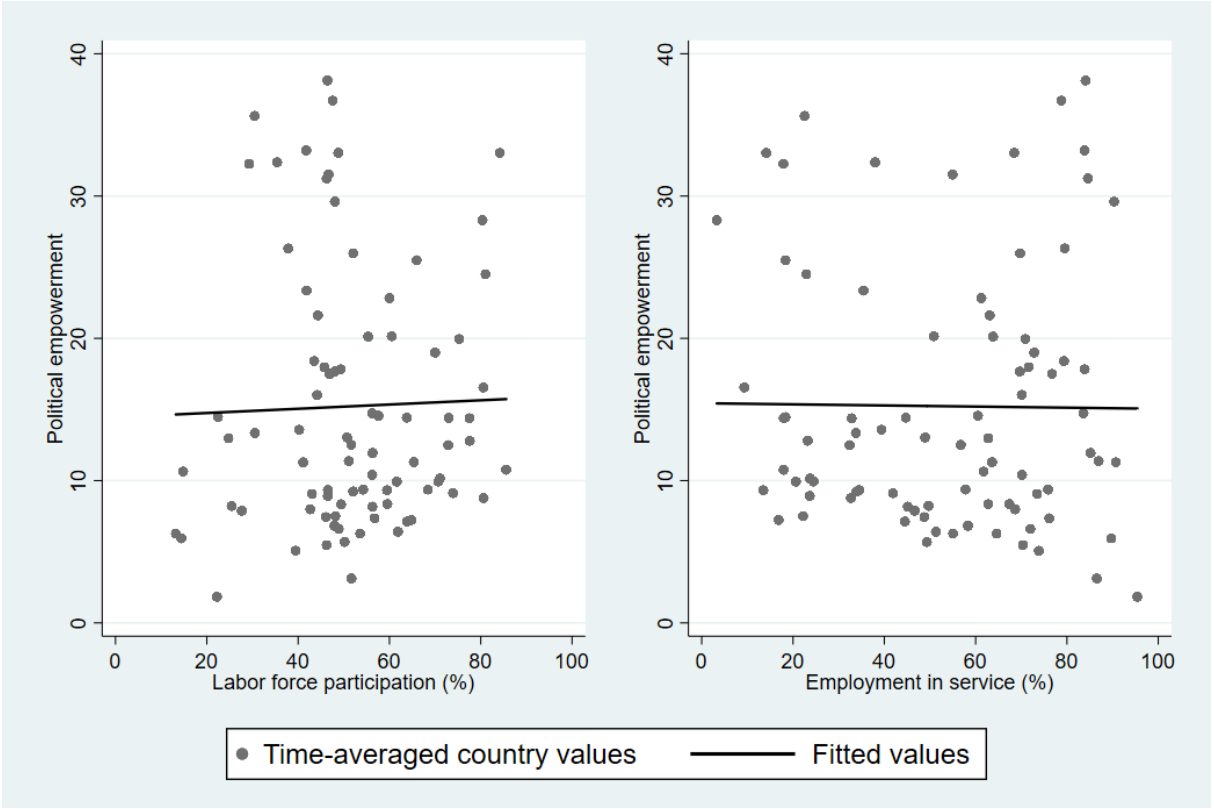
Appendix C: Average values for labor force participation and employment in service, high-income countries



Appendix D: Sub-index graphs, time-averaged country values






Political empowerment
0
10
20
30
40
0
20
40
60
80
100
Labor force participation (%)
Political empowerment
0
10
20
30
40
0
20
40
60
80
100
Employment in service (%)
Time-averaged country values
Fitted values

Appendix E: Time-averaged-OLS, with quadratic effects

	(1)	(2)	(3)
	Time-averaged OLS	Time-averaged OLS	Time-averaged OLS
VARIABLES	EDU	HEA	POL
LFP	0.255***	0.004	-0.282*
	(0.090)	(0.017)	(0.149)
SER	0.476**	0.047	-0.666*
	(0.206)	(0.040)	(0.342)
SER2	-0.002	-0.000	0.004*
	(0.001)	(0.000)	(0.002)
c.LFP#c.SER	-0.006***	-0.000	0.004
	(0.002)	(0.000)	(0.003)
GDPpcPPP	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
PR	-1.271	-0.122	-0.044
	(0.968)	(0.186)	(1.610)
CL	0.844	0.060	-1.377
	(1.292)	(0.249)	(2.150)
OADR	-0.791***	0.029	-0.077
	(0.184)	(0.035)	(0.306)
YADR	-0.448***	0.028**	-0.011
	(0.057)	(0.011)	(0.095)
Buddhist	-6.823**	0.435	-0.344
	(2.731)	(0.526)	(4.544)
Hindu	-12.141***	-0.908	-1.820
	(3.483)	(0.670)	(5.793)
Muslim	-7.871***	-0.693*	-6.187**
	(1.854)	(0.357)	(3.084)
Constant	111.501***	94.106***	51.898***
	(8.809)	(1.696)	(14.654)
Observations	845	845	845
R-squared	0.760	0.338	0.225
Number of countries	82	82	82

Standard errors in parentheses. Standard errors clustered by country.
*** p<0.01, ** p<0.05, * p<0.1

Appendix F: Panel regression with fixed effects, with lagged main regressors

VARIABLES	(1) Fixed effects EDU	(2) Fixed effects HEA	(3) Fixed effects POL
L.LFP	0.325	0.005	-0.170
	(0.214)	(0.058)	(0.311)
L.SER	0.741***	0.010	0.019
	(0.257)	(0.044)	(0.287)
L.SER2	-0.004***	-0.000	-0.001
	(0.001)	(0.000)	(0.004)
cL.LFP#cL.SER	-0.005*	0.000	0.001
	(0.003)	(0.001)	(0.005)
GDPpcPPP	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
PR	0.034	-0.041	-0.066
	(0.239)	(0.048)	(0.414)
CL	0.267	-0.039	-0.258
	(0.317)	(0.114)	(0.862)
OADR	-0.404*	-0.106	0.008
	(0.222)	(0.066)	(0.774)
YADR	-0.262***	-0.026*	-0.525***
	(0.079)	(0.015)	(0.167)
Constant	77.966***	98.446***	46.059*
	(15.140)	(3.340)	(23.290)
Observations	780	780	780
R-squared	0.182	0.039	0.133
Number of countries	82	82	82

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1