Degree Project in Economics (15 credits)

School of Business Economics and Law at The University of Gothenburg, year 2017

Supervisor at University of Gothenburg was Hoang-Anh Ho

Could Information and Communication Technologies decrease gender inequality?

Cross-country evidence

Abstract

Information and Communication Technology (ICT) is rapidly changing the society and affecting several of the issues that the world is facing. One of them is the issue of gender inequality, which is especially predominant in the developing world. Previous qualitative studies states that ICT could be one of the most helpful tools to decrease poverty and diminish the global gender gap.

This study examines the relationship between ICT and gender inequality. The causation is likely to go both ways, more ICT in a country increases the equality between genders through empowerment of women and the distribution of information, while a more gender equal country is likely to increase ICT.

The result of the study showed that there was a negative relationship between ICT and gender inequality through several OLS regressions. The results varied between high and low-income countries, with ICT having a lower overall fit for low-income countries but with a greater potential than for high-income countries. Overall, we draw the modest conclusion that it seems to exist a relationship, countries with higher ICT also tend to be more gender equal and vice versa.

Keywords: ICT, Gender inequality, Equality

UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Magnus Friberg

Monika Andersson

Contents

Tables

Figures

Concepts

Gender:

The Office of the Special Adviser to the Secretary-General on Gender Issues and Advancement of Women, OSAGI (2001) defines the word "gender" as the social characteristics and opportunities that relate to being a male or a female, as well as the relationships between women and girls and the relationships between men and boys. But also, the relationships between girls and boys and women and men. This is socially constructed attributes, opportunities and relationships that people learn throughout life in all kind of socialization processes. All of them are changeable and context/time-specific.

Gender tells what is normal, accepted, expected and valued in a woman or in a man in a given context. In almost every society there are several differences and inequalities between women and men when it comes to what responsibilities are assigned, which activities are undertaken, what kind of access to and what kind of control over resources that is possible, as well as who have the most decision-making opportunities. Gender is a part of a socio-cultural context that is broader and includes class, race, poverty level, ethnic group and age.

Gender equality:

Gender Equality is described by OSAGI (2001) as equal rights, responsibilities and opportunities for boys and girls, and women and men. A person's human rights, responsibilities and opportunities should not rely on whether they are born as male or as female. Gender equality indicate that interests, needs and priorities of both women and men should be taken into consideration and acknowledging the diversity that exists of different groups of men and women. Gender equality is not only a women's issue but should fully involve and concern men as well. Equality between the genders is seen both as a human rights topic and as a precondition for and an indication of, sustainable people-centered development.

ICT:

ICT stands for Information and Communication Technologies and is broader than the concept of IT (Information Technology). Techtarget (2017) states that there is no definite definition for ICT, but in general term it includes all technologies that combined allows people, businesses, organizations and governments to interact in a digital way. The different components of ICT generally include access, data, communication technologies, transactions technologies, hardware, software and cloud computing.

United Nations Broadband Commission (2013) define ICT as:
"Information and communication technologies or digital technologies including the hardware, software and networking capabilities that enable mobile phones, tablets, laptops and desktops computers, as well as serves and other equipment found in data centers ".

Digital divide:

There are several aspects to digital divide. Techtarget (2014) refers to it as the gap between those who have access to ICT and those that do not, usually across different demographic groups and different regions. In general, the digital divide exists between more or less developed countries but also between different socio-economics groups, between the more or less educated parts of the population, between rural areas and urban areas and between women and men. Even where people have access to technology there could be a digital divide between what kind of technology, and between the quality and quantity of the technology (the speed of wireless connections, the affordability of the connection, access to computers versus mobile phones etc).

1 Introduction

1.1 Background

"Achieving gender equality and empower all women and girls", this is how The United Nation's fifth sustainable development goal is described. Although gender equality has seen great progress the last decade, with increased school attendance, higher paid labor force participation for females etc, gender equality in 2017 is still a major problem for the world's population. Women are still a marginalized group. (United Nations, 2016) Not only is it a human right for women to have the same rights and opportunities as men, but it is also economically advantageous for individuals and nations to be more equal. Increased women's labor force participation or reduced gender wage gap contributes to faster economic growth (International Labour Organization, 2014).

As with gender equality, the Internet and ICT services have grown at a rapid pace. In the year of 1995 not more than 0.4% of the world's population used the Internet in any form. Two decades later almost every other person was estimated to be using the Internet according to the International Telecommunication Union (ITU, 2016). For most people living in developed countries, the Internet is a natural everyday tool. ITU states that in 2016, an estimate of around 80% of people in the developed countries used some form of Internet connectivity during the last three months, compared with around 40% for developing countries. The figure becomes even smaller when looking at the percentage of the Internet use for the African continent, one in every four persons, and when observing the countries classified as "least developed countries" (LDC), the number is one in seven. So even if the Internet has grown at a very fast speed the last couple of years, there is still a big digital divide between developed and developing countries.

This is unfortunately just one aspect of inequality in technology. There is also a big digital divide between the female population and the male population. Even if it is not the technology itself that discriminates and makes it harder for women to gain access and use, it is the context and social barriers that makes it more challenging. It could be lower levels of income, lower education, more illiteracy, and social norms that hinder women from using ICTs to the same extent as men do. E.g. The United Nations Broadband Commission Working Group on

Broadband and Gender (2013) report that 75% of women are literate in the developing world compared to 86% of men, and in some countries the difference is even larger. This of course makes it difficult for women to learn and to master ICT with the technology we have so far. ITU reported in 2016, that the Internet penetration were higher for men than women in all the world's regions. With Africa and the Arab States showing the largest digital divide between genders.

Unfortunately, the gap has increased between year 2013 to 2016, the difference in digital divide between gender in the world has increased from 11 to 12.2%, where developed countries have reduced the gap; while in developing countries, there has been an increase. But on the contrary, the proportion of women that are engaged in ICT has grown dramatically, although not in the same pace as for men. (ITU, 2016)

Since both gender inequality and ICT have improved dramatically over the past decade, it obviously becomes interesting to investigate if there is a relationship between them. Could it be that ICT has contributed to increased gender equality in the world? There are many qualitative studies that highlight the benefits of ICT for individuals. Access to the Internet could enable women to increase their efficiency and productivity, getting access to new markets, improve their education, find better jobs, and contribute with innovations and modernizations. A higher use of ICT in the world could render in an efficient use that exploits the full talent of the population and thereby achieve prosperity. The opportunities of ICT have not been unnoticed and the United Nations (UN) has therefore recently added equality in ICT as one of its targets to achieve the goal mentioned initially. (United Nations, 2016)

Gurumurthy and Chami (2014) have found that ICT has increased women's opportunities to acquire information, hence facilitating the acquisition of necessary information that previously have not been possible. It also appears that ICT has increased the asocial power for women, which can be described as belonging to a collective, to feel a part of something and to be able to make a change that matters for others. Lastly, is the communicative power, which means that you can shape the environment in which you live. Not only regional but also from a broader perspective.

Thus, just like gender equality, women's use of the Internet is not only an important human rights question but also an economic beneficial path to take. (UN Broadband commission, 2013)

This report could be helpful to give some guidance for policy makers and other researchers about what ICT does for gender equality and empowerment from an individual and macro perspective supported by quantitative data.

Further in this study we will examine previous literature done on the subject, then in section 2, we will go through our hypothesis and the theory to why we think our hypothesis is legitimate. In section 3, we will explain how we collected data and what model we chose to study our hypothesis. In section 4 our results will be interpreted and then in the discussion section (5) will the findings of the results be discussed. To complete the work, we will explain how our study can assist in future studies (section 6) but also what studies we suggest could be further developed. Finally, the conclusions are presented in section 7.

1.2 Literature review

There are a lot of qualitative studies that investigate whether ICT can empower women. However, the number of quantitative studies is limited. We will examine both qualitative and quantitative studies that have a concrete relationship to our title.

Badran (2010) examines whether *ICT is empowering women in Egypt*. The study is based on national data from the Egypt labor market panel survey made in 1998 and then in 2006 with questions to the same group. The study uses a regression model to measure the impact of ICT usage on women's empowerment. The model used to measure women's empowerment in the study is the following; $Women\ Empower\ index = \beta 0 + \beta 1\ ICT\ index + \beta 2\ age + \beta 3\ age2 + \beta 4\ real\ monthly\ wage + \beta 5\ Empl\ status + \beta 7edu + \beta 8\ region + e$, where the empowerment index is based on the following aspects; the share of the women in decisions making in the household, access to cash, mobility, less violence exposure and gender role. The ICT index was based on whether the respondents were in possession of a telephone, colored TV, computer, cell phone, or a satellite dish. The regression was controlled for age, monthly wage, employment status, level of education and in what region in Egypt the respondent lived. The results show that ICT has a significant effect on women's empowerment in Egypt. However, ICT is not significant

when the study controls for specific characteristic variables such as occupational role, employment in public / private sector.

Another study made by Kucuk and Balcilar (2011) uses panel regressions for 209 countries and investigates how ICT and Institutional and Social Infrastructure factors affect the gender gap in employment and education defined as *the ratio of female to male labor force activity* and *the ratio of female to male enrolled in primary and secondary education*. The results show that ICT has a significant impact on reducing the gap in both education and work. Also, according to the study, ICT has a greater impact in countries with better social infrastructure factors, such as better bureaucratic quality, less corruption, less political risks, more stable governments, good legal system, and better democracy. Thus, for ICT to achieve its full potential, the authors suggest that other social factors should be developed in conjunction with ICT.

In a more qualitative study made by Intel (2013) in collaboration with UN Women and State Department, women in urban and peri-urban areas in four developing countries (Egypt, India, Mexico, and Uganda) were observed. Together with already existing data and interviews with experts within the field, the goal of the report was to identify solutions to reduce the digital difference that exists between men and women so that women can achieve their full potential. The study focuses on understanding how women use the Internet and what the positive outcomes are. Based on the answers from the interviews, the beneficial outcomes were divided into three categories (Esteem and expression, Opportunities, Knowledge and networks)

In the *esteem and expression* category, the most frequent answer was that the Internet provided them with increased confidence and self-worth, while the improved connectivity led to the possibility of exchanging ideas and making their voice heard more loudly in society, the household, and on the political arena. For the *opportunities* category, most respondents answered that the Internet had contributed in the field of education and work. Several had used the Internet to find information in their current education, while others had taken courses online. Some reported that they used the Internet to find scholarship and grants. In India 59% of the interviewed women responded that Internet had been used while searching for job. Regarding *knowledge and networks* did health services be the one thing that women most

benefited from. Even for non-user, responded this was the biggest incentive of starting using the Internet.

So finally, let's look what previous studies tells us about demographics of ICT. In a study made by Jellema and Brudvig in 2015, where door-to-door interviews and surveys were done in urban areas for nine developing countries, did education seem to play a very important part whether the respondent used the Internet or not. Only 2% of women with any previous education responded that they were using the Internet. And among those who were uneducated, men were ten times more likely to use Internet than women. The results from these surveys showed that for every additional level of education more women and men respondent they were using the Internet and the gender gap decreased for every level. When looking at people with a tertiary educational level, the number of women using the Internet was 78% while the number for men was 83%. Hence the gap is almost diminished. The report also concluded that women with higher education used the Internet differently than those with low or no previous education. According to the report, women with high education utilized the Internet to a higher extent to search for health and job-related information. From the report, we can also read that age is important for the Internet penetration. Every other woman aged 18-29 responded using the Internet and seven out of ten for men. Then the number gradually decreases for each age range, and for women aged 50-59, the Internet penetration was 15% for females and 21% for men in the same age range.

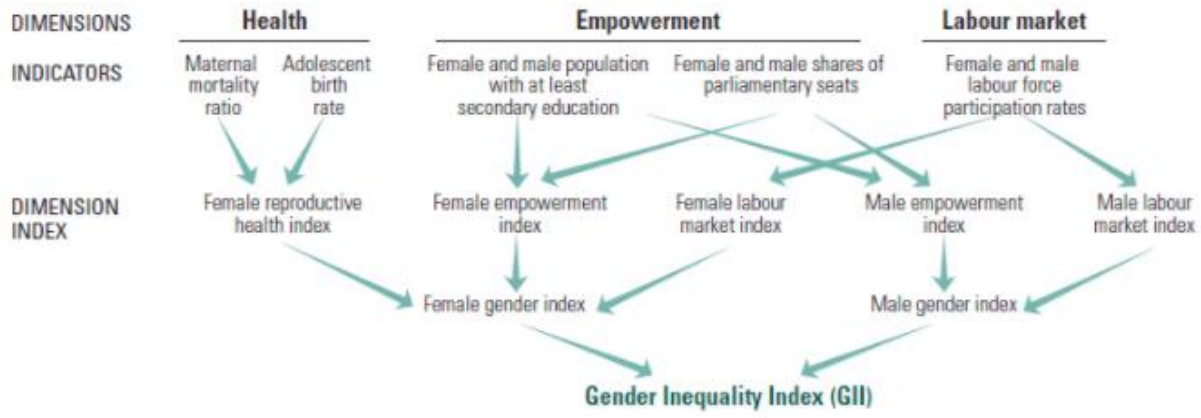
Most previous studies in the subject have a qualitative approach, while those using a quantitative approach have focused on either more in-depth analyzes for a specific country, or for several countries but with one or a few dependent variables, which does not cover gender equality to a substantial extent. This study we will use a cross-sectional qualitative methodology and combine previous research to investigate how ICT affects gender equality based on a gender inequality index for several countries. Thus, the study encompasses several variables of gender equality but also at a global level. Furthermore, the countries used in the study will be divided into low and high-income countries to see if ICT affects gender equality differently depending on a country's economic conditions.

2. Theoretical framework

The goal with this study is to investigate whether ICT can act as a tool to increase equality between genders but also if its effect differs depending on a country's economic conditions. The study will look at differences between low and high-income countries. We will not put any weight to the difference in distribution of ICT between men and women in our model. This is because the organ ITU that keeps statistics of ICT by gender only has data for a limited number of countries. Thus, this report will only observe the effect of the total amount of ICT penetration regardless of gender distribution, and observe its relationship with gender inequality.

The intention is to observe the correlation between a country's (population's) ICT penetration and its value on the Gender Inequality Index (GII) scale (according to United Nations Development Programme's Index) on a cross-county level. Are countries with a higher penetration of ICT more equal than countries with a lower amount of penetration.

Figure 1 – Layout, GII



(Figure 1: Human development report, 2016)

In figure 1 are the different dimensions and indicators displayed that are included in United Nations Development Programme's Gender Inequality Index. We will present a theoretical hypothesis why ICT can act as a means of reducing gender inequality for each dimension and its indicators. We have added a variable for the dimension of labour market dimension to also include the number of females/males holding a financial account.

2. 1 Why ICT is important for reproductive health

The influence of ICT in countries is considerably important for reproductive health from two perspectives, the health institutions and the individual's perspective. From the first perspective, The UN Broadband Commission (2017) states that increased use of ICT enables doctors and health care workers to keep track of the latest research and trends but also to gather information from digital databases for doctors regarding different symptoms and other necessary knowledge that are helpful when taking care of pregnant women before and during childbirth. The UN Broadband Commission report that digitized health systems could include diagnostic images, laboratory, clinical and pharmaceutical records, system administrative data and relevant demographic and other personal data that could be extremely helpful to ensure that surveillance systems are more action-oriented and to prioritize limited resources in the most efficient way.

From the individual perspective, ICT contributes to improved contact with the health institution. This is especially important for the indicator, *maternal mortality ratio,* where ICT facilitates discussion during the pregnancy process and makes it more cost efficient for both the health institution and the patients. ICT also enables access to necessary information to control that the pregnancy follows the steps that are expected. Dalberg (2013) states that information given by the Internet has a particularly effect on pregnant women on prenatal care and to encourage safer deliveries. But it also provides other information about what is harmful to the unborn child and what should be avoided, such as alcohol and drugs. This has been shown to be a problem in some developing countries. Isaksen, Østbye, Mmabaga and Daltveit (2015) found that 34.1% of mothers in Northern Tanzania consumed alcohol during their pregnancy.

ICT is also useful in reducing the number of young people who give birth to children early in life, which is the other indicator in the reproductive health dimension. WHO (2014) explains the significantly larger risks that are entailed when a girl is going through a pregnancy too early in her life. Pregnancy and childbirth are the second most common cause of death for girls aged 15 to 19. According to WHO there is 50 percent higher risk for a baby to an adolescent girl to be stillborn or to die in the first few couple of weeks, than for babies born by women aged 20 to 29. There is also a significant larger risk that the baby is born underweight that could cause many different complications later in its life. WHO also states that being a mother too early in life has major social and economic impacts on girls' life.

They could have problem to finish their education, find an employment, and therefore be more economically and socially marginalized. Younger girls are more likely to not know about, or feel inhibited or ashamed about seeking information about contraceptives, and in many countries, they may be very expensive or even illegal, which make WHO believe that many adolescent pregnancies are not only dangerous but also unwanted.

2.2 Why ICT is important for empowerment

From a general perspective, increased access to ICT per se improves a woman's empowerment for a whole lot of aspects (Intel 2013). As mentioned earlier, the study from Jellema and Brudvig (2015), showed that *education* was a significant factor whether people used the Internet or not. From these results, it can be interpreted that education allows individuals to develop a general knowledge of the Internet, indicating that we have a reversed causality. However, we can also read from Intel's (2013) and Dalberg (2013) surveys and interviews, that ICT has opened opportunities for individuals in low-income countries by enabling online courses and making it possible to retrieve exams through online university studies. It also enables individuals to seek school-related information that may be difficult to access otherwise, due to excessive costs or long distances. It is therefore reasonable to assume that the causation goes both ways. Not only is it positive that ICT helps women to more easily acquire an education, but also the spillover effects from education that contributes to the society. OECD (2012) writes in their report that education accounted for 50% of economic growth from 1960-2008 and half of that was because more women were getting additional education. Considering the rate of development that the Internet has had in recent years, it is logical that ICT will be even more integrated with school education in the future.

However, there is also a risk that those who are not involved in the digital development will end up even further behind. The World Bank (2016), states that the development of ICT has created an increasing amount of jobs that require technical knowledge while routine jobs are increasingly being challenged by digitalization. An effect of this may be that those who do not have good enough knowledge in ICT could end up even further behind in the digital community. It is therefore of the utmost importance that ICT is integrated early in school education so everyone can benefit from it.

Looking at the *political indicator* in the empower dimension, The Swedish International Development Cooperation Agency, SIDA (2009) did a report that exploit what ICT could do

for democratizations and transparency, especially in considerably new and developing democracies. ICT can contribute to several human rights, included freedom of speech; poverty reduction and the free flow of information. SIDA argues that ICT can help the promotion of social equity, gender equality and higher quality of life and social diversity in general. ICT can help marginalized groups to get access to information and make it possible for them to make their voices heard in societies where they otherwise would have been discriminated when it comes to political participation. The Internet makes it possible to find information but also to create local relevant content. SIDA states that one of the key factors that make ICT a useful tool for striving towards transparency is the possibility to hold government accountable for their respective mandates. It makes the democratization a more reliable process. A fundamental part of democratization is that the population takes their part as active citizens, and ICT simplifies that.

2.3 Why ICT is important for economic status

Nikulin (2016) argues that more ICT use, mostly more Internet connectivity, will create more opportunities for people, especially women, to find jobs, but also that it will be easier for employers to find the right worker, creating a more efficient *labour market*. In theory, people can through telecommunication and outsourcing work globally no matter where they live. Therefore, ICT could be a helpful tool to overcome some social, geographical and economical barriers that prevent people from participate in the labor force. Nikulin continues to state that ICT can make the labor market more transparent, inclusive, innovative, flexible and efficient, which will benefit especially women that before been locked out from having a formal employment.

ICT has dramatically increased the ability to have a *financial bank account* and overall there is a growing belief that not being financially included in a society has negative effects for individuals. Having access to a financial bank account facilitates running companies, investing in education etc. (International Bank of Reconstruction and Development, 2014)

2.4 Hypothesis

From a theoretical perspective, our hypothesis is that increased ICT penetration for all of society's institutions and individuals, will improve gender inequality within a country from especially two aspects. The first is when more females are being engaged and exposed to ICT which enable them to take advantage of all the beneficial parts from ICT mention earlier.

The second aspect is the general increased access to ICT services regardless of gender. According to Intel (2013), conservative gender roles can be challenged when people, regardless of their gender, gets exposed to new perspectives through the Internet. Thus, the question we are trying to answer is:

Are countries with higher ICT penetration less gender unequal?

3 Method and Data

To observe the correlation of our hypothesis, we have chosen to use the theories behind a multiple linear regression analysis and the practice behind *ordinary least squares*. This is used to observe relationships between explanatory variables and a dependent variable. We will use several multiple regression models that measure different dependent variables corresponding to the indicators viewed in figure 1. To understand the results of the different models and interpret its values and compare them to each other, we will use the same independent variables for all regression models.

3.1 Multiple Regression Analysis

The regression written in the form of a matrix:

$$\boldsymbol{Y} = \boldsymbol{\alpha} + \boldsymbol{\beta X} + \boldsymbol{\epsilon}$$

Y is our dependent variable that will be the outcome for the various aspects of gender inequality. The number of observations **Y** will take differ for every regression due to limitations in our dataset. $\boldsymbol{\alpha}$ represents the intercept. **X** is a matrix containing our independent and controlled variables;

$$\boldsymbol{X} = (\boldsymbol{x_{i,1}}\boldsymbol{x_{i,2}} \ldots\ldots \boldsymbol{x_{i,n}})$$

$\boldsymbol{\varepsilon}$ is the random error component the occurs in our model.

3.2 Data sample

Since this is a desk study, the collected information comes from several relevant online sources that have a connection with our regression model. For determining our list of low and high-income countries, The World Bank (2017) lists countries based on a country's GNI per capita as, low-income, low middle-income, high middle-income or high-income, where we have used the former as low-income and the latter as high-income countries in our model.

The term "gender inequality" is a wide definition and a lot of its aspects are hard to measure, such as gained self-esteem, independence, sense of safety etc. For the data that is available and tangible for measurement, the information is often limited for developing countries and

especially for the least developed countries in the world. Hence, we have chosen to use one of the larger and well-known gender inequality indices available. The data for our gender inequality index (GII) is gathered from the latest report made by the United Nations Development Programme.

When gathering data regarding ICT penetration, the choice fell naturally on ITU, which is the United Nations' agency for ICT. The data gathered comes from their yearly ICT development index that was introduced year 2009 and gathers information from 175 countries.

Since some developing countries have limited, unsure, or no data available, either because there is no data from UNDP on GII or because ITU does not have sufficient measurements regarding the ICT penetration, we have decided to only include those countries with sufficient information with the consequence that some countries are excluded from our model.

3.3 Variables

Dependent variable

Gender Inequality Index (GII)

We know that GII is not a complete measurement for inequality, but it is one of the few tools that can be used to measure what can be assumed to be an indication of gender inequality. The index ranges from 0-1 where 0 is an indication of perfect gender equality and 1 indicates total gender inequality. The mean value for all the 159 countries that have a GII value is 0.3596 with a standard error of 0.0150. The index measure gender inequality out of three main aspects, which all includes sub groups. We will measure the various aspects that the index contains and after that observe what parts of the index that have more effect and those that have less effect. The first group is *reproductive health* that contains the subcategories *maternal mortality ratio* and *adolescent birth rate*. The second one is *empowerment* that consist of *proportion of parliamentary seats occupied by females* and *secondary education*. The third group *economic status*, did only consist of the variable *labor market participation* so we added a variable from The World Bank called *percentage of respondents with an account at a financial institute* to make it more even. (See Appendix 9.1)

Independent variables

The ICT development index (IDI):

To gather as much information as possible regarding ICT, we have chosen to use the variables that are derived from the ITU annual index (IDI). The index has been around since 2009 and is one of the more comprehensive measurements for ICT. The index contains three different sub-categories. We will use the one called ICT use, which measures the penetration of ICT in a country from the perspective of the whole society, both household usage and organization usage are included. The sub-index contains three sub-categories that are all weighted equally and are merged into one value that ranges between 0-10 where 10 is the highest value that can be achieved. The mean value for all 170 countries is 3.9629 with a standard error of 0.1895. (ITU, 2016)

Percentage of individuals using the Internet

Individuals using the Internet refers all individuals who used the Internet in any form regardless of location or type of device in the last three months.

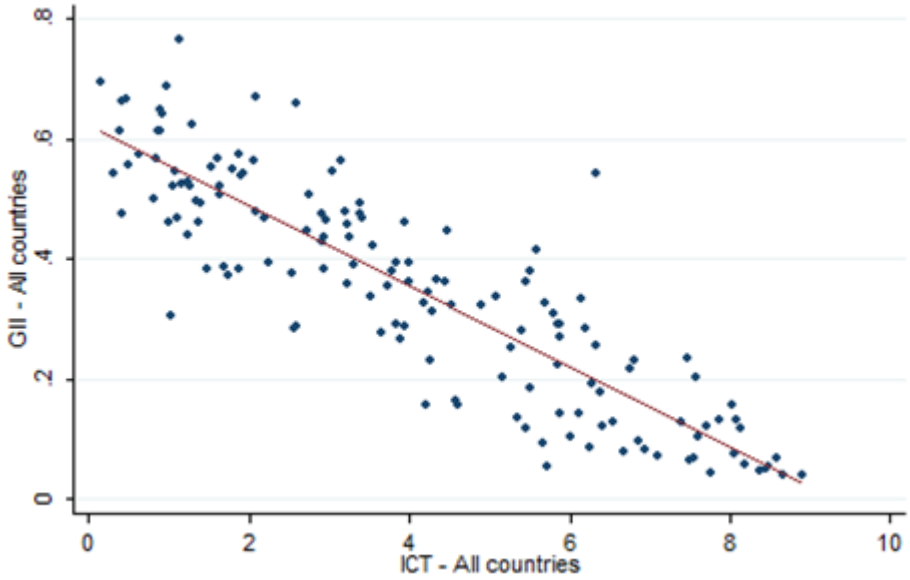
Fixed-Broadband subscriptions per 100 inhabitants

Fixed-broadband subscriptions refers to high-speed access (256kbit/s or faster) for fixed-broadband for both individuals and organizations in one country.

Active mobile-broadband subscriptions per 100 inhabitants

Active mobile-broadband subscriptions refer to high-speed access (256kbit/s or faster) for mobile-broadband for both individuals and organizations in one country. SMS and MMS are not included in this category.

Figure 2 – Relationship between GII and ICT



Above in figure 2, we can see the relationship between GII and ICT. Looking at the graph, we see a clear relationship that indicates that increased use of ICT correlates to a lower gender inequality value.

Control variables

GNI per capita

To control for a country's general welfare, we have chosen to use GNI per capita as a control variable. In the report of International Bank of Reconstruction and Development (2016) GNI per capita is used as a control variable when examining the relationship between several explanatory variables on dependent equality variables such as Ratio of Female to Male Enrollment in Secondary Education, Female Employment to Population Ratio, Percent of Companies with a Female Top Manager, Borrowed from a financial institution, female (% age 15+). The variable is based on the purchasing power parity (PPP) for the current international dollars based on the 2011 ICP round. To easily interpret the values in our regressions, we measure GNI / capita per $ 1000. (The World Bank, 2016)

Rural population (% of total population)

Many countries in developing regions have a large population living in rural areas. Although Mobile-broadband networks (3G or above) has an access range that covers 84% of the world's

population, there are still a considerable number, especially in Africa that do not even stand within the access range due to poorly infrastructure (International Telecommunication Union, 2016). One of the reasons for this are discussed in the study made by Intel (2013) where the reason for not building an infrastructure that enables Internet access to people in rural areas is that the effect will not be as dominant than for more developed areas. For the Internet to have a substantial impact on a society, some basic infrastructural elements should already exist. Thus, policymaker has less incentive to invest in increased Internet infrastructure where other more urgent efforts must take place first. The variable is the proportion of the population living in an area classified as "rural". The classification is made individually for each country. The data is from The World Bank (2016).

Health expenditure, public (% of GDP)

A large part of the variables in the GII consists of reproductive health related indicators, therefore we have chosen to control for this by using the government expenditure of health care as the percentage of GDP in a country (The World Bank, 2016).

Press Freedom Index

For ICT to have the effect of gender equality according to our hypothesis, it is important that individuals and institutions share and exchange information without restrictions preventing this. To control for this at some level, we will be using the press freedom index as a proxy variable for the problems of social norms and limited information dissemination (Freedom House, 2016). The Press freedom index ranges from 0 (worst) to 100 (best) and are scored on 23 questions that are divided into three categories. Based on the score, a country can be classified as Free, Partly Free, or Not Free.

4. Results

When we examine our regression models, we will only look at the results and examine their authenticity. We will not draw any conclusions about the results. This will happen in our discussion section later in the essay.

4.1 Baseline regression

Table 1

Coefficient	(1)	(2)	(3)	(4)	(5)	(6)
ICT	-0.0671*** (0.0027)	-0.0728*** (0.0046)	-0.0774*** (0.0062)	-0.0638*** (0.0035)	-0.0655*** (0.0034)	-0.0783*** (0.0071)
Rural		0.0008* (0.0005)				0.0007 (0.0005)
GNI / Capita			-0.0015* (0.0008)			-0.0012* (0.0006)
Health Care				-0.0076* (0.0040)		-0.0035 (0.0033)
Press Freedom					0.0003 (0.0004)	0.6e-04 (0.0004)
Intercept	0.6226*** (0.0136)	0.6796*** (0.0409)	0.6329*** (0.0145)	0.6617*** (0.0233)	0.5996*** (0.0308)	-0.6917*** (0.0499)
Nr of obs	149	149	143	149	149	143
R^2	0.7716	0.7766	0.7904	0.7803	0.7728	0.7957
Prob > F	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
Root MSE	0.0896	0.08895	0.0859	0.0882	0.0869	0.0857

Significance level *p<0.1 **p<0.05 ***p<0.01
The model is used with the robust variance estimator

In the baseline regression, ICT shows a significant result along with all variables that we control for individually but also for all variables together. Furthermore, GNI per capita, rural and health care also show a significant result individually with ICT. The fact that ICT demonstrates a significant level of p-value < 0.01 for all controlled variables separately but also when we include all variables in one model is a very strong indicator that there is a correlation between ICT and GII.

The model also shows a relatively high coefficient of determination of 0.7957, which means that our model explains 79.57% of the deviation of our dependent variable.

4.2 ICT and GII

Table 2

Coefficient	World	High income countries	Low income countries
ICT	- 0.0783*** (0.0071)	- 0.0773*** (0.0083)	- 0.0477*** (0.0162)
Rural	0.0007 (0.0005)	0.0013** (0.0006)	0.0005 (0.0009)
GNI / Capita	- 0.0012* (0.0008)	- 0.0004 (0.0009)	- 0.0110* (0.0065)
Health Care	- 0.0035 (0.0033)	- 0.0051 (0.0042)	- 0.0043 (0.0055)
Press Freedom	0.6e-04 (0.0004)	0.0002 (0.0005)	- 0.0011 (0.0010)
Intercept	0.6917*** (0.0499)	0.7175*** (0.0607)	0.7039*** (0.0957)
Model validation			
Nr of obs	143	88	55
R^2	0.7957	0.7251	0.4783
Prob > F	0.0000***	0.0000***	0.0000***
Root MSE	0.0857	0.0776	0.0928

Significance level *p<0.1 **p<0.05 ***p<0.01
The model is used with the robust variance estimator

When looking at table 2, comparing the index for high-income countries and for low-income countries we can observe a pattern suggesting that ICT has a significant stronger coefficient of determination for high-income countries of 0.7251 to 0.4783 for low-income countries. Still both models are showing significant coefficients for ICT at p-value < 0.01. The magnitude is significantly higher for high-income countries which tell us that one additional unit for our ICT index decreases the Gender Inequality Index by approximately 0.0773 units or 5.15 standard errors from the mean. While one additional unit of ICT for our low-income countries decreases the Gender Inequality Index by approximately 0.0477 units or 3.18 standard errors from the mean.

We can also see that the proportion of individuals living in rural areas has a significant effect on GII for high-income countries. However, the magnitude is relatively low. By contrast, a country's GNI per capita has quite a significant impact on low-income countries in terms of how it is reflected on the Gender Inequality Index.

4.3 ICT and reproductive health

Table 3

	Maternal mortality ratio		Adolescent birth rates	
Coefficient	High income	Low income	High income	Low income
ICT	- 33.6948*** (7.2679)	- 44.1819* (24.8850)	- 11.1777*** (2.1621)	- 10.4583** (4.9520)
Rural	0.2376 (0.0027)	1.3917 (1.5378)	0.2172* (0.1391)	0.5177* (0.0071)
GNI / Capita	- 0.3910 (0.4300)	- 42.2200*** (9.2100)	- 0.1730 (0.1221)	7.2100*** (1.8300)
Health Care	2.1070 (2.1501)	- 1.1234 (1.2416)	- 0.8628 (1.1114)	- 0.3177 (2.1873)
Press Freedom	0.1339 (0.2463)	1.1592 (1.2891)	0.1313 (0.1150)	0.2409 (0.3025)
Intercept	214.1691 (48.6872)	582.0218*** (155.0667)	114.3896 (18.5229)	168.4728*** (28.2392)
Model validation				
Nr of obs	93	61	95	61
R^2	0.4718	0.4794	0.5380	0.4206
Prob > F	0.0000***	0.0000***	0.0000***	0.0000***
Root MSE	57.609	171.22	20.164	34.023

Significance level *p<0.1 **p<0.05 ***p<0.01
The model is used with the robust variance estimator

Table 3 shows the results from the regression on the reproductive health dimension, illustrating the effect on ICT on maternal mortality ratio (MMR) and adolescent birth rates (ABR). The regressions made on maternal mortality ratio demonstrates that ICT is significant for both low and high-income countries with the former to have a higher level of significance. However, the magnitude of low-income countries is approximately 33% higher were an additional unit of ICT reduces the maternal mortality ratio by approximately 44 women per 1000 live births.

ICT is also significant for both low and high-income countries when regressing on adolescent birth rate (ABR). The magnitude is approximately the same for both demographics, where an additional unit of ICT reduces the number of adolescent birth rates with approximately 11 adolescent females per 1000 females aged 15-19 years old. We can see a similar pattern for GNI per capita for low-income countries as the only significant control variable.

4.4 ICT and empowerment

Table 4

Proportion of adult females and males aged 25 years and older with at least some secondary education					Proportion of parliamentary seats occupied by females	
Coefficient	High income		Low income		High income	Low income
	Males	Females	Males	Females		
ICT	7.6686*** (1.4691)	6.9424*** (1.3833)	12.0517*** (4.4376)	12.0318** (4.7821)	0.1411 (0.8990)	0.8081 (1.5215)
Rural	- 0.1807 (0.1294)	- 0.1877* (0.1194)	- 0.0058 (0.2271)	- 0.0864** (0.0254)	- 0.0045 (0.0619)	- 0.1584 (0.1246)
GNI / Capita	0.0820 (0.0940)	0.0370 (0.0800)	1.9100* (1.3100)	2.9500** (1.4200)	0.0100 (0.0800)	1.1100* (0.6400)
Health Care	0.4701 (1.0501)	0.8859 (0.9162)	0.2040 (1.2922)	0.3238 (1.2861)	0.8925 (0.6802)	1.2147* (0.6136)
Press Freedom	- 0.0702 (0.1133)	- 0.1396 (0.1026)	- 0.0729 (0.2087)	- 0.1113 (0.2325)	- 0.0918* (0.0549)	0.1935** (0.0940)
Intercept	38.6580*** (14.0472)	45.3293*** (12.8374)	20.0981 (17.5437)	2.2590 (18.8151)	19.5882** (8.1175)	14.9714 (10.1929)
Model validation						
Nr of obs	89	89	55	55	95	61
R^2	0.3809	0.3893	0.4259	0.4440	0.1486	0.1532
Prob > F	0.0000***	0.0000***	0.0000***	0.0000***	0.0155***	0.0691*
Root MSE	15.356	14.697	21.375	23.064	9.9257	12.133

Significance level *p<0.1 **p<0.05 ***p<0.01
The model is used with the robust variance estimator

The results from the dimension of empowerment showed that the magnitude of ICT in low-income countries is little short of two times greater than for high-income countries, when looking at its effect on the number of females and males with some secondary education. For both men and women in low-income countries, a unit increase in the ICT index results in that the proportion of men and women with some type of upper secondary education increases by a bit over 12% points each while the corresponding value for high-income countries are around 7% points for both genders. We can also see that there is a significant effect on the variable rural in both low and high-income countries, but only for the female sex. Furthermore, GNI per capita is significant for both men and women in low-income countries.

The next dependent variable included in the dimension of empowerment, is "Proportion of Parliamentary Seats Occupied by Females". Here, ICT is not significant for neither low nor high-income countries. This is the first time that ICT does not prove to be significant in none of the models. Instead, it appears to be the freedom index that is significant for both low and high-income countries. Also, GNI per capita and the percentage of the government expenditures spent on health care are significant for low-income countries. We will discuss later why we believe that ICT does not show any significant results for the proportion of parliamentary seats occupied by females.

4.5 ICT and economic status

Table 5

Labour market participation					Percentage having an account at a bank or another type of financial institution			
Coefficient	High income		Low income		High income		Low income	
	Males	Females	Males	Females	Males	Females	Males	Females
ICT	-1.2322 (0.7799)	0.4801 (1.0753)	-1.5198 (1.8189)	3.8570* (2.2712)	7.6172*** (1.2464)	8.9104*** (1.3451)	0.4846 (2.6262)	1.3045 (2.5809)
Rural	-0.0044 (0.0571)	-0.1593* (0.0862)	-0.0031 (0.0810)	-0.0158 (0.1260)	-0.2572* (01288)	-0.3708** (0.0862)	-0.2042 (0.1937)	-0.2818 (0.2070
GNI / Capita	0.1300*** (0.0400)	0.0850* (0.0500)	0.4900 (0.5300)	4.6100*** (0.7800)	0.2800*** (0.0920)	0.2500* (0.1300)	4.4200*** (1.4500)	3.9300** (1.5100)
Health Care	0.5375 (0.3803)	0.2053 (0.4288)	1.1127* (0.5622)	2.0327* (1.0718)	0.0659 (0.5473)	0.0574 (0.5752)	0.0271 (0.8169)	0.2149 (0.8000)
Press Freedom	-0.0733* (0.0405)	-0.0850 (0.0705)	-0.0359 (0.0666)	-0.0123 (0.1390)	-0.1804* (0.0986)	-0.2932*** (0.1046)	-0.2322 (0.1563)	-0.2703* (0.1491)
Intercept	75.6152*** (7.0366)	43.2443*** (9.0948)	86.7492*** (7.2364)	82.5444*** (12.2630)	24.395* (12.6497)	14.5058 (13.9655)	13.2623 (15.7831)	3.7711 (17.6575)
Model validation								
Nr of obs	92	92	60	60	77	77	49	49
R^2	0.2805	0.3838	0.2115	0.3269	0.7402	0.7566	0.3841	0.4189
Prob > F	0.0001***	0.0838*	0.0449**	0.0000***	0.000***	0.000***	0.0287**	0.0207**
Root MSE	7.224	10.733	7.5406	16.609	11.244	12.506	15.315	15.064

Significance level *p<0.1 **p<0.05 ***p<0.01
The model is used with the robust variance estimator

When looking at table 5 and the impact of ICT on labor market participation, only females in low-income countries provide a significant result. Also, GNI per capita shows a significant result for three out of four regressions with only exception for men in low-income countries.

As mentioned earlier, an additional dependent variable has been added for the dimension of economic status. The added variable measures the effect of ICT on the proportion of the population that holds a bank account at a financial institution. There is a clear difference between low and high-income countries. For high-income countries, ICT is significant at p-value < 0.01 for both women and men, while the relationship of ICT for low-income countries is insignificant with very high standard errors. Furthermore, the magnitude is relatively strong for high-income countries where an additional unit of ICT for a country increases the proportion of men who have access to a bank account with 7.6172% points, and 8.9104% points for women. Also, GNI per capita is significant for all demographics and the variable press freedom for three of four demographics.

5. Discussions

ICT has a strong negative relationship with the Gender Inequality Index when observing all countries. This in line with our hypothesis that ICT can reduce gender inequality. High-income countries had an overall better fit for our models, supporting the study made by Kucuk and Balcilar (2011) that ICT has a more explanatory effect when established institutional and social infrastructure are in order. However, our results could be affected by the lower sample size for low-income countries. This is because "outliers" in a small sample size have a greater impact. But it may also be that low-income countries are more dependent on other factors that we have not controlled for in our regression, which would make our model omitted for low-income countries. It is difficult to control for this but we have chosen to use the variables we found to be most important based on previous quantitative and qualitative studies.

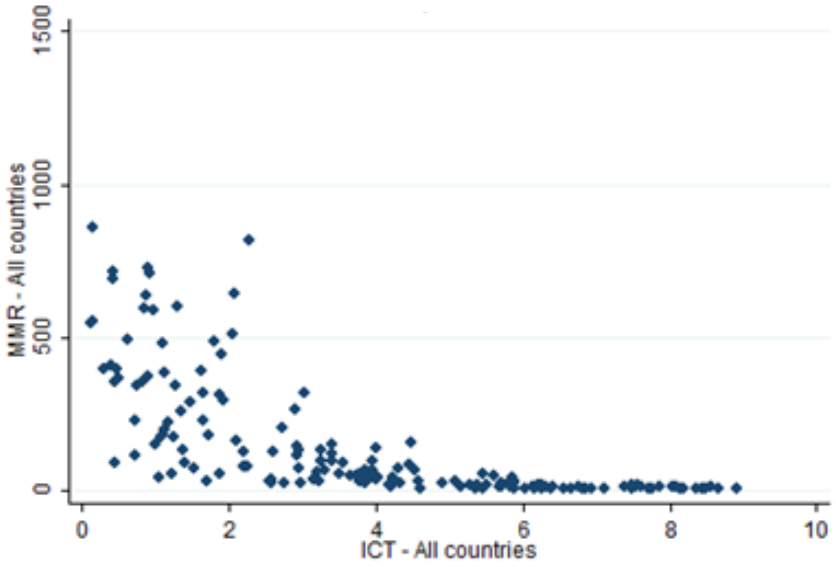
Further in this section will we look at the different indicators of our gender inequality index and discuss the relationships that we have find and try to derive a logical reason for that, supported by our data and other research.

5.1 Linkage with reproductive health and ICT use

The linkage between ICT in a country and its effect on reproductive health is significant for low and high-income countries and the results of our model support previous qualitative researches. In our regressions, the coefficient of determination is higher for high-income countries for both the maternal mortality ratio and the adolescent birth rate. Suggesting that ICT has a greater predictable effect for reproductive health in high-income countries than for low-income countries. However, as mentioned earlier in the results, the magnitude is about one third so powerful for low-income countries, which indicates that it has a greater impact.

An interesting observation about the maternal mortality variable, is that ICT has an effect to a certain level, then the relationship flattens out. This indicates that ICT penetration greatly reduces the maternal mortality ratio to a level of approximately 4.5 on the ICT scale, after that the slope decreases modesty but in a stable manner for all countries above 4.5 on the scale. As can been shown in figure 3, the relationships mimic an exponential decay curve and that is why we find a stronger magnitude for low-income countries.

Figure 3 Relationship between MMR and ICT



Nevertheless, this is a reasonable observation because the number of maternal mortality death is less limited for high values on the y-axis while it is finite on the downside since the values cannot fall below 0. This will result in a greater magnitude for low-income countries, suggesting that ICT is more important for low-income countries in terms of reducing the maternal mortality ratio.

The other aspect of reproductive health measured in our index was that on Adolescent Birth Rate (ABR). The magnitude of ICT is approximately the same for high and low-income countries, with the difference that the variation is slightly higher for low-income countries, with a lower level of significance. Indicating that unlike MMR, ABR does not have the same exponential decay curve and thus the effect of ICT is approximately the same for low and high-income countries. This is somewhat a surprising but positive result, because low-income countries are generally more oppressed and therefore ICT should not have the same influence as for high-income countries. Our results however, indicates that ICT can help young females regardless of a country's economic status to reduce the number of adolescent births.

ICT is only one factor of many explaining the effect of reproductive health that has not been controlled for in our model, such as the overall infrastructure of the health institutions in a country and other socio-economic factors. Thus, looking at GNI per capita, it is not surprising

that it is significant for low income for both of our dependent variables in the dimension of reproductive health.

5.2 Linkage between empowerment and ICT use

The effect of ICT varies between our two dependent variables in the empowerment dimension. Looking at the effect for the variable "proportion of parliamentary seats occupied by females ", our coefficient of determination is relatively low for both low-income and high-income countries. This suggests that the model do not explain the deviation for our dependent variable to a high extent. Likewise, the coefficients of ICT are insignificant for both low and high-income countries with particularly high standard errors. Thus, we cannot use ICT to explain the variable of proportion of parliamentary seats occupied by females.

There could be a few distinct reasons behind this. The fact that elections takes place at contrasting times for different countries, and some as early as 2012 in the past. Together with that ICT has been growing incredibly fast in recent years, will result in that the value of ICT do not reflect the dependent variable in a fair way, creating a mismatch. Even though there is a strong relationship between a country's ICT value today and five years ago, the problem remains that the elections have fallen over different periods of times for every country, so comparing a country's election 2012 for country X with an election hold in 2015 for country Y is problematic given the growth of ICT.

This could explain why press freedom is significant for a country's share of seats held by females observed in table 4, since the process of changing press freedom is a significantly longer process, which means that the difference in a country's press freedom value for 2012 and 2015 on average should be significantly lower than the corresponding figure for ICT, hence the significant value for press freedom. Thus, to measure the specific effect of ICT for the proportion of seats held by females, a better approach would be to only compare the countries that have had an election during a narrow period, and see if there is a correlation.

Other problems exist when measuring the impact of ICT on the percentage of women in parliament. There are laws denying women accessing seats in parliament, censorship of the Internet, social norms, old traditions etc. Also, there are an increasing number of applied gender quotas in countries worldwide, used to set a minimum limit of women that must hold a seat in parliamentary positions. This obviously limits the influence of ICT and also its

significance on the proportion of parliamentary seats occupied by females (International Bank of Reconstruction and Development, 2016).

When regressing on the proportion of women and men who have some form of secondary education, both low and high-income countries show significant results for ICT, which again supports the results from Kucuk's and Balcilar's (2011) study, but also the statement from UN that parity in education have seen great progress during the last decade. (United Nations, 2016)

However, not only is the magnitude for ICT higher for low-income countries, in contrast to our other regressions, low-income countries have a higher goodness of fit in the education indicator. Something that contradicts the results in Kucuk's and Balcilar's (2011) study. An explanation for this may be the rapid development of ICT since their study was done.

5.3 Linkage between economic status and ICT use

The indicator for economic status in the GII contains information about the labor participation for females and males that are over 15 years old. The indicator is a bit misleading in our opinion because it only measures the labor force participation and not what the gender wage gap is for similar jobs. This allows countries to be gender equal according to the index because the labor force distribution between men and women are equally, while many women in poor and suppressed areas work with wages that are significantly lower than those for men. E.g. Mozambique has higher labor force participation for women of 82.5% compared to 75.4% for men. But according to World Economic Forum (2016) Mozambique is ranked as one of the worst countries when it comes to wage differentials between genders.

We found that ICT has a significant effect on women in low-income countries and holds the expected direction of magnitude. We believe there are two main reasons for this. One can be, as we have written before, that ICT enables women to engage more easily in the job market, which makes them more competitive and therefore increases their opportunities to participate in the labor force.

Secondly, since ICT measures the penetration for the whole society and not for men and women separately, and since ICT increase economic growth (The McKinsey Global Institute, 2011), it can help women in low-income countries to benefit to a higher extent, because they

come from a lower average market penetration than our other demographics and therefore benefits more from an increased economic growth. This may be the reason why only women in low-income countries prove a significant effect together with the reason we mentioned initially that the payment gap is of immense importance. The results imply that ICT not only empowers women, but it also reduces the level of gender inequality in this aspect.

In our additional model that we added for economic status, which measures the number of women and men who hold a bank account with a financial player, there are two conclusions. The first is that the relationship and magnitude are significantly more pronounced for high-income countries, indicating that there are probably several factors that prevent individuals in low-income countries from creating a financial account. One problem could be that there are fewer incentives for people in low-income countries to hold a back account. In a survey made by Dalberg in 2013 many people responded that it is too expensive and that they do not have enough money to even considering open a bank account. Another reason may be that there is a misunderstanding among the banking system and the states in general that individuals prefer to keep money in cash or elsewhere that do not involve interference with the country's own financial system. Furthermore, most banks and financial institutes also tend to not give out credit to poor people in low-income countries. Poor people, and especially poor women, lack access to collateral, and the costs to gather information, monitor and enforce repayment are as high for small loans as they are for big loans. (Grameen Bank, 2015).

The other conclusion that can be drawn from our regression is that the effect of ICT has a greater impact on women than it has on men for high-income countries. Suggesting that females in high-income countries are both empowered and that the gender gap is shrinking.

6. Further research

This study could be useful for further research in ICT and what it can contribute with for gender equality. A concrete continuation of this study would be to investigate whether ICT's impact on gender equality differs from our results if we consider the percentage of each gender using ICT. However, as we mentioned earlier, the data is considerably more limited for this, so an alternative path would be to deepen the research into one or a few limited countries. With such a type of study, one can determine the effect of a country's total use of ICT with respect to the gender distribution of ICT.

Another interesting approach to this may be to use another measure of gender inequality to investigate whether the results also demonstrate a relationship between ICT and gender equality. Alternatively, the global gender gap index by the World Economic Forum could be used as a possible substitute, which uses other variables in its index. This would strengthen the authentication of our report and on the subject in general.

It would also be interesting to use ITU's other sub-index on ICT that does not measure the penetration in a country but to what extent people have access to ICT. Even though they are highly correlated, it would still be interesting if the results differ from our study.

Because this is one of the earlier studies of its kind, it would be interesting in future studies to investigate in what direction the causality goes, even if many studies suggest that it is possible that it goes both ways (Intel, 2013). Proposals to solve this problem would be to find a proxy variable that is correlated with ICT but not related to gender equality.

7. Conclusions

Our main idea was to research if there were any relationship between ICT and gender inequality on a cross-country level and distinguish if the result differs depending on a country's economic status. So, to answer our hypothesis, *are countries with higher ICT penetration less gender unequal?*

The outcome of our regressions demonstrated that ICT has a strong correlation with UNDP's gender inequality index and most of its indicators. The higher level of ICT, the less gender unequal a country seems to be. The relationship was overall significant for both low and high-income countries, apart from the number of seats held by females in parliament, labor market participation for high-income countries and ownership of financial bank account for low-income countries.

Generally, ICT had a lower goodness of fit in low-income countries, except from education, where our study suggests there has been a change from previous literature in the field. The results also demonstrated that the potential for low-income countries is greater than for high-income countries for most of our gender indicators, but they are also more dependent on institutional and social infrastructures than high-income countries.

The results of our study do not interpret the causality of ICT on gender inequality, but our findings suggest that countries would benefit of higher ICT penetration. Thus, we draw the modest conclusion that ICT increases gender inequality in the world for both low and high-income countries.

8. Reference list

Association for Progressive Communications, ITC for Democracy Information and Communication Technologies for the Enhancement of Democracy - with Focus on Empowerment, Swedish International Development Cooperation Agency (Sida), SIDA52470en, 2009

Badran, Mona F., Is ICT empowering women in Egypt? An empirical study, 2010, Cairo University, Cairo, Egypt

Blaauw Isaksen, Alexander, Østbye, Truls, Theophil Mmbaga, Blandinaand, Daltveit, Anne Kjersti, Alcohol consumption among pregnant women in Northern Tanzania 2000-2010: a registry-based study, PMC US National Library of Medicine National Institute of Health, 2015, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4559883/ (*20-05-2017*)

Broadband Commission for Sustainable Development, Digital Health: A Call for Government Leadership and Cooperation between ICT and Health, 2017, ITU and UNESCO

Dalberg, Impact of the Internet in Africa - Establishing conditions for success and catalysing inclusive growth in Ghana, Kenya, Nigeria and Senegal, April 2013

Grameen Bank, 2015, Introduction, December 2015, http://www.grameen.com/introduction/ (*20-05-2017*)

Gurumurthy, Anita and Chami, Nandini, The long march to we-gov: Insights from the *Women-gov* action-research project in India (2012-2014), International Development Research Centre, 2014

Intel, Women and the Web - Bridging the Internet gap and creating new global opportunities in low and middle-income countries, Intel and Dalberg, 2013

International Bank of Reconstruction and Development, Global Financial Development Report 2014; Financial Inclusion, The World Bank, 2014

International Bank of Reconstruction and Development, Women, Business and The Law 2016; Getting To Equal, The Word Bank, 2016
International Labour Organization, Global Employment Trends 2014: Risk of Jobless recovery?, 13.01.3, 2014

International Telecommunication Union, ICT Facts and Figures 2016, ITU, 2016
ITU, 2016, ITC facts and figures 2016, end-2016 estimates for key ICT indiactors, 2016 http://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx (*20-05-2017*)

Jellema, Anne and Brudvig, Ingrid Women's right online; translating access into empowerment, World Wide Web Foundation, Global report, 2015

Kucuk, Nezahat and Balcian, Mehmet, On the Gender Gap, ICT, and Institutional and Social infrastructure: A Dynamic Panel Data Analysis, 2011, Eastern Mediterranean University, Famagusta, North Cyprus

Nikulin, Dagmara, The impact of ICTs on women's economic empowerment, Gdańsk University of Technology, Faculty of Management and Economics, Narutowicza 11/12, 80-233 Gdańsk, Poland, 2016

Manyika, James and Roxburgh, Charles, The Great Transformer: The impact of the Internet on economic growth and prosperity, McKinsey Global Institute, October 2011

Organisation for Economic Co-operation and Development (OECD), Gender Equality in Unesco Education, Employment and Entrepreneurship: Final Report to the MC; 2012, Meeting of the OECD Council at Ministerial Level, 2012

Office of the Special Advisor on Gender Issues and Advancement of Women, Strategy for Promoting Gender Equality, OSAGI, UN Women, 2001

Techtarget, 2017, What is ICT, March 2017, http://searchcio.techtarget.com/definition/ICT-information-and-communications-technology-or-technologies (*20-05-2017*)

Techtarget, 2014, digital divide, June 2014, http://whatis.techtarget.com/definition/digital-divide (*20-05-2017*)

The Broadband Commission Group on Broadband and Gender, Doubling Digital Opportunities- Enhancing the Inclusion of Women and Girls in the Information Society, ITU and UNESCO, 2013

The World Bank, Digital Dividends, World Development Report, 102725, 2016

United Nations Educational, Scientific and Cultural Organization (UNESCO), 2017, ICT in Education, 2017, http://www.unesco.org/new/en/unesco/themes/icts/ (*20-05-2017*)

United Nations, 2016, Sustainable development goals; 17 goals to transform our world, 2016, http://www.un.org/sustainabledevelopment/takeaction/ (*02-06-2017*)

United Nations Development Programme, Accelerating Gender Equality and Women's Empowerment in Africa, Africa Human Development Report, 2016

World Economic Forum, 2016, Global Gender Gap Report 2016, http://reports.weforum.org/global-gender-gap-report-2016/economies/#economy=MOZ (*20-05-2017*)

Data

Freedom House, 2016, Freedom of the Press 2016 Table of Scores, 2016, https://freedomhouse.org/report/freedom-press-2016/table-country-scores-fotp-2016 (*20-05-2017*)

Human Development Report, 2016, Gender Inequality Index (GII), United Nations Development Programme, http://hdr.undp.org/en/content/gender-inequality-index-gii (*06-06-2017)*

Intenrational Telecommunication Union (ITU), 2016, ICT Development Index 2016, http://www.itu.int/net4/ITU-D/idi/2016/ (*20-05-2017*)

Internatioanl Telecommunication Union (ITU), 2017, The ICT Development Index (IDI): conceptual framework and methology https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2016/methodology.aspx (*20-05-2017*)

The World Bank, 2016, GNI per capita, PP (current internal $), 2016, http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD (*20-05-2017*)

The World Bank, 2016, Rural Population (% of total population), 2016 http://data.worldbank.org/indicator/SP.RUR.TOTL.ZS (*20-05-2017*)

The World Bank, 2016, Health Expenditure, public (% GDP), 2016, http://data.worldbank.org/indicator/SH.XPD.PUBL.ZS (*20-05-2017*)

The World Bank, 2016, High income, http://data.worldbank.org/income-level/high-income (*20-05-2017*)

The World Bank, 2016, High middle income, http://data.worldbank.org/income-level/upper-middle-income
(*20-05-2017*)

The World Bank, 2016, New Country Classicfications, https://blogs.worldbank.org/opendata/new-country-classifications (*02-06-2017*)

The World Bank, 2017, Low Income, http://data.worldbank.org/income-level/low-income (*20-05-2017*)

The World Bank, 2017, Lower middle income, http://data.worldbank.org/income-level/lower-middle-income (*20-05-2017*)

United Nation Developement Programme (UNDP) , 2016, Gender Inequality Index (GII), http://hdr.undp.org/en/content/gender-inequality-index-gii (*20-05-2017*)

World Health Organization (WHO), 2014, Adolescent Pregnancy, September 2014, http://www.who.int/mediacentre/factsheets/fs364/en/ (*20-05-2017*)

9 Appendix

9.1 The World Bank Country Classification

Low-income countries: GNI per capita of $1,045 or less

Middle-income countries: GNI per capita of more than $1,045 but less than $12,736

High-income countries: GNI per capita $12,736 or more

Lower-middle-income and upper-middle-income economies are separated at a GNI per capita of $4,125, therefore we grouped the lower-middle-income countries as low-income and upper-middle-income as high-income countries.

9.2 Abbreviation

Table 6 – Abbreviation

	Mean	Std. Err	95% conf. Intervall		Nr of obs
ABR	47.8561	2.9561	42.0237	53.6885	184
FAM	55.5799	2.6171	50.4061	60.7537	142
FAW	50.3995	2.7634	44.9364	55.8626	142
GII	0.3596	0.0150	0.3300	0.3892	159
GNI / Capita	19306.37	1588.956	16170.75	22441.98	179
Health care	6.7838	0.2029	6.3835	7.1840	190
ICT	3.9629	0.1895	3.5888	4.3370	170
LFPM	74.1741	0.6366	72.9179	75.4303	179
LFPW	52.7565	1.1942	50.3999	55.11307	179
MMR	170.2376	17.3331	136.0354	204.4398	181
PPSF	20.7486	0.8336	19.1043	22.3929	191
Press Freedom	48.7602	1.6999	45.4077	52.1127	196
PWEM	63.7445	2.1342	59.5301	67.9589	163
PWEW	59.8257	2.3605	55.1645	64.4870	163
Rural	40.4568	1.6595	37.1859	43.7281	214

ABR (Adolescent birth rate), FAM (Financial account male), FAW (Financial account woman), GII (Gender inequality index), GNI / Capita (Gross national income per capita), Health care (% expenditure of gdp spent on health care), ICT (Information and Communication Technologies), LFPM/LFPW (Labour market participation, measured by labour force participation rate of female and male populations aged 15 years and older), MMR(Maternal mortality ratio), PPSF (Proportion of parliamentary seats occupied by females), Press Freedom (Press Freedom index), PWEM/PWEW (Proportion of adult females and males aged 25 years and older with at least some secondary education), Rural (% of total population)

9.3 List of countries

Table 7 – List of countries

High-income countries		Low-income countries	
Albania	Jordan	Afghanistan	Syrian Arab Republic
Algeria	Kazakhstan	Armenia	Tajikistan
American Samoa	Korea, Rep.	Bangladesh	Tanzania
Andorra	Kuwait	Benin	Timor-Leste
Angola	Latvia	Bhutan	Togo
Antigua and Barbuda	Lebanon	Bolivia	Tonga
Argentina	Libya	Burkina Faso	Tunisia
Aruba	Liechtenstein	Burundi	Uganda
Australia	Lithuania	Cabo Verde	Ukraine
Austria	Luxembourg	Cambodia	Uzbekistan
Azerbaijan	Macao SAR, China	Cameroon	Vanuatu
Bahamas, The	Macedonia, FYR	Central African Republic	West Bank and Gaza
Bahrain	Malaysia	Chad	Vietnam
Barbados	Maldives	Comoros	Yemen, Rep.
Belarus	Malta	Congo, Dem. Rep.	Zambia
Belgium	Marshall Islands	Congo, Rep.	Zimbabwe
Belize	Mauritius	Cote d'Ivoire	
Bermuda	Mexico	Djibouti	
Bosnia and Herzegovina	Monaco	Egypt, Arab Rep.	
Botswana	Montenegro	El Salvador	
Brazil	Namibia	Eritrea	
British Virgin Islands	Nauru	Ethiopia	
Brunei Darussalam	Netherlands	Gambia, The	
Bulgaria	New Caledonia	Ghana	
Canada	New Zealand	Guatemala	
Cayman Islands	Northern Mariana Islands	Guinea	
Channel Islands	Norway	Guinea-Bissau	
Chile	Oman	Haiti	
China	Palau	Honduras	
Colombia	Panama	India	
Costa Rica	Paraguay	Indonesia	
Croatia	Peru	Kenya	
Cuba	Poland	Kiribati	
Curacao	Portugal	Korea, Dem. People's Rep.	
Cyprus	Puerto Rico	Kosovo	
Czech Republic	Qatar	Kyrgyz Republic	
Denmark	Romania	Lao PDR	
Dominica	Russian Federation	Lesotho	
Dominican Republic	San Marino	Liberia	
Ecuador	Saudi Arabia	Madagascar	
Equatorial Guinea	Serbia	Malawi	
Estonia	Seychelles	Mali	
Faroe Islands	Singapore	Mauritania	
Fiji	Sint Maarten (Dutch part)	Micronesia, Fed. Sts.	
Finland	Slovak Republic	Moldova	
France	Slovenia	Mongolia	
French Polynesia	South Africa	Morocco	
Gabon	Spain	Mozambique	
Georgia	St. Kitts and Nevis	Myanmar	
Germany	St. Lucia	Nepal	
Gibraltar	St. Martin (French part)	Nicaragua	
Greece	St. Vincent and the Grenadines	Niger	
Greenland	Suriname	Nigeria	
Grenada	Sweden	Pakistan	
Guam	Switzerland	Papua New Guinea	
Guyana	Thailand	Philippines	
Hong Kong SAR, China	Trinidad and Tobago	Rwanda	
Hungary	Turkey	Samoa	
Iceland	Turkmenistan	Sao Tome and Principe	
Iran, Islamic Rep.	Turks and Caicos Islands	Senegal	
Iraq	Tuvalu	Sierra Leone	
Ireland	United Arab Emirates	Solomon Islands	
Isle of Man	United Kingdom	Somalia	
Israel	United States	South Sudan	
Italy	Uruguay	Sri Lanka	
Jamaica	Venezuela, RB	Sudan	
Japan	Virgin Islands (U.S.)	Swaziland	