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Female educational enrollment, labor force participation and
economic growth:

A panel-data study in Europe

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Abstract

During the last decades, female engagement in both educational and working activities has rapidly increased in many European countries. Hence, it is of interest to study whether this increase could be of significant importance for the economic growth. In this thesis, the goal is to examine the relationship between female educational level, female labor force participation and economic growth through the analysis of panel data from 16 European countries

In the majority of countries studied, female educational level nowadays is quite high. Furthermore, looking at enrollment data for primary, secondary and tertiary educations one can see an increasing trend over time. However, despite a rapid increase during the last thirty years, we still see significant differences in male and female labor force participation in many European countries.

In our study, when studying female labor force participation our results did not show any significant relationship between increases in the labor participation rate and the growth rate. However, for education we found a significant result showing that female educational enrollment is positively associated with economic growth.

Keywords: Economic growth, education, employment, gender, labor participation

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(Sources of Figures 1-8: World Bank)

1. Introduction

As Europe has experienced modernization during the last five decades, the female population's engagement in both the education and the labor force have rapidly increased. Women have historically been underrepresented in working and educational activities. The role of women was often limited to taking care of the children and doing non-paid work such as housework, compared to men who often were a part of the labor force providing living for the family, and who often had higher education than women (World Bank).

In neoclassical economic theory, economic growth is described from the production perspective, where it is driven by size of the labor force, size of capital stock and the technological progress. Educational level is one of the factors, which many researchers believe could have an impact on the level of technological progress and on the effectiveness of the labor force (Burda & Wyplosz, 2012).

Several studies have been conducted to explore the relationship between education and economic growth. For instance, Uzawa (1965) and Lucas (1988) have through their research developed new ways to account for the impact of education on technical progress and the effectiveness of the labor. Nelson and Pheleps (1966) described higher educated labor as more capable of using new innovations as well as adapting more effectively to new technologies.

The Solow growth model (Burda & Wyplosz, 2012) describes population growth as one of the fundamentals for economic growth since it directly effects the labor supply. Even though nearly half of the world's population consists of women, they are still underrepresented in both educational and paid work activities in many countries (World Bank).

Since labor is one of the main inputs in the Solow Growth model, and educational level is expected to play an important role in driving technological progress increasing female labor participation rate and higher female educational enrollment should be positively associated with economic growth. Numerous studies supported that statement. For example Schultz (2002) argued that investment in female education could result in

positive externalities since female workers tend to work more hours than male workers do. Other studies found that gender inequality in educational levels is negatively correlated with economic growth (Klasen, 2002). Further, Goldin (1995) claimed that female educational levels were associated with higher labor force participation rate and due to this associated with economic growth.

In Europe, female enrollment in education is high and has been increasing during the last decades. Labor participation rates also show an increasing trend, though it is of importance to mention that we, in general, still see substantial differences between the genders (World Bank). Due to this increasing trend in several European countries, we found it interesting to conduct a study aiming to explore the relationship between economic growth, female labor participation rates and educational enrollment rates.

To achieve our aim, the following questions will be answered in this thesis:

- Is the increase in female enrollment in tertiary education significantly associated with economic growth rates?
- Is the increase in female labor participation rates significantly associated with economic growth rates?

To answer these questions, we examine female educational enrollment rates, labor force participation rates and GDP growth rates in 16 European countries over time using panel data analysis. This thesis is organized as following. We begin by describing the theoretical background and giving an overview of the economic theory. Thereafter, we briefly review the literature used in our study, the data and method for the statistical analysis, results and the conclusion.

2. Background

2.1 Solow Growth model

The Solow growth model is a well-established theory, describing the fundamentals of economic growth. The two main inputs in this model are capital and labor, although the technical level and population growth also play an important role for growth in the long run. (Burda & Wyplosz, 2012). The labor force participation rate and education can be connected to different aspects of this theory and in this section, we will explain how.

In this theory, the production function is the main source for understanding what the economic growth consists of. The key inputs are as described above, physical capital K and labor supply L . The simple version of the production function can be presented as:

$$Y = F(K, L),$$

Where the output Y is a function F of capital K and labor L .

Another key component of this theory is technological progress, which can be included in the production function. The production function including the technical level can be written as:

$$Y = F(A, K, L),$$

where the output Y is a function F of technical progress A , capital K and labor supply L .

2.2 The law of diminishing marginal productivity

The marginal productivity of capital is given by the partial derivative of Y with respect to K and is an increasing function of L and a decreasing function of K :

$$MP_K = \frac{\partial Y}{\partial K}.$$

In the same way, the marginal productivity of labor is an increasing function of K and a decreasing function of L :

$$MP_L = \frac{\partial Y}{\partial L}$$

This is due to the law of diminishing marginal productivity which means that when we increase one of the inputs, while holding the other inputs constant, a point will be reached beyond which we will experience diminishing returns for every new unit of this input (Burda & Wyplosz, 2012).

2.3 The Steady state

The steady state is the long run average behavior, which the economy never actually reach, but fluctuates around. To understand the concept of the steady state, we first need to understand the fundamentals of capital accumulation and depreciation in this specific model.

All physical capital faces depreciation, a decrease of the value by a certain rate which is referred to as δ . In order to prevent this depreciation, an investment I needs to be made. Hence, there is only one way to save and that is by capital investment. The amount of savings relative to the income is given by sY and here is $sY = I$ (Mankiw, 2010).

Gross investments are the amount of money spent on a new capital and net investments are the increase in the capital stock. After we have considered depreciation, the equation can be written as:

$$\Delta K = sY - \delta K,$$

where δK is the depreciation of the capital. Logically, since the depreciation is proportional to the size of the capital stock, we will face greater depreciation when we increase the capital stock.

The steady state is the point where a newly accumulated capital only compensates the capital lost to depreciation, the point where the depreciation line crosses the investment line. Whenever we are below this point, our capital stock will grow until we reach the

point where the investment is equal to the depreciation. In the same way, whenever we are above the point, the capital stock will decrease until we reach the steady state. Therefore, the economy is always drawn towards this state, where output and capital grow at the same pace and persist constant in proportion to labor.

2.4 Population growth and economic growth

Even though capital accumulation can explain parts of the economic growth, it does not explain permanent, sustained growth. One factor that can explain it is population growth, which is one of the fundamentals for economic growth within this model.

Since our thesis mainly focuses on the labor part of this theory, the effect of population growth on economic growth is important for our study.

It is worth noting, that although the hours worked per person have decreased steadily over the past decade (OECD Stat, 2016) employments have increased because of exogenous factors, such as population growth and an increase in female labor force participation.

Our empirical study is an attempt to examine whether an increase in the female labor force participation in some European countries is associated with the economic growth rate, and therefore we find this theory to be an appropriate base for this thesis.

As mentioned in the section above, the economy is always drawn towards the steady state, at which the capital-labor and output labor ratios stabilize. This means that if labor L grows at an exogenous rate n because of population growth, capital K as well as outcome Y will adapt by growing at the same rate n . Thus, the economy is driven by the exogenous population growth rate n , which is increasing growth in a more permanent way, since it results in a higher steady state.

2.5 Technological progress and economic growth

Another fundamental factor for economic growth is technological progress, since it permanently increases the steady state level. As we mentioned above, a technical level is included in the production function by the variable A :

$$Y = F(A, K, L).$$

The economy is drawn towards the steady state level of capital-labor and output-labor ratios. Therefore, with population growth and technological progress, the increase in capital will keep adjusting until we are at a higher steady state level.

So, what is the driving force behind the technological progress? In the Solow growth model, A is assumed to constantly increase at an exogenous rate a . It is well understood, that investments in human capital play an important role in driving innovation and thereby technological progress. In this thesis, we among others focus on an increase in female enrollment in education, and we expect to find the connection between education and technological progress. If increase in educational level plays an important role in technological progress, it could as well be related to the economic growth.

2.6 Effective labor

The notion of technological progress leads us to another important concept, the effective labor. In this context, technological level A is directly linked to labor L by the variable AL . Hence, the production function is the following:

$$Y = F(K, AL),$$

where output Y is given by a function F of capital K and the effective labor. Mathematically, we will have an increase in Y , when we have either an increase in A as well as in L .

For example, a 10% increase in A gives the same effect on Y as an increase in L by 10%, telling us that the effective labor can produce more output with the same number of workers. Therefore, if education is linked to innovations and technical progress, it is also linked to the effectiveness of labor AL . If we have an increasing technical level due to increasing educational level, it also influences the effectiveness of the labor.

There are scientific discussions concerning how the educational level is connected with the productivity of the workers. Knowledge should play an important role for the workers helping them to easier absorb new technologies and find more productive ways to work. Because of this, higher educational level could be associated with higher output per worker.

3. Literature review

In this thesis, we shall explore the relationship between female educational level, female labor participation and economic growth. Therefore, it is important to briefly some of the literature used here.

There are several studies conducted in the area of human capital and its effects on economic growth. Human capital is defined as the skills that the labor force has, often referred to as investments in the education and training of people. These investments, in turn increase the efficiency of workers, leading to the increase in productivity (Goldin, 2016).

Uzawa (1965) was one of the first researchers who studied the effects of human capital on economic growth. Lucas (1988) developed his theory further and described the technological change as the average stock of human capital, embodied in labor. He presented a model where the human capital advancement is the key component for describing economic growth. According to his theory, the productivity depends on both the stocks of human and physical capital, and he described human capital as a factor increasing the productivity of the workers and therefore increasing and improving the outcome.

Nelson and Phelps (1966) discussed the effect of education on technological progress and argued that skilled workers are more likely to innovate technologies comparing with low-skilled workers. The authors emphasized that education is an essential factor for economic growth and that greater human capital level results in greater technological advancement. In their paper, they studied the effect of human capital on technological progress and pointed out two factors of importance. These factors are the technology in practice and the theoretical level of technology, which is referred to as a measure of the stock of techniques and knowledge that is available to the innovators. The larger is the gap between these two factors, the less effective the economy will be in adapting new technologies. According to the authors, an improved technological practice is determined by the size of the gap between the technology in practice and in theory as well as the level

of human capital in the economy. In other words, human capital plays an essential role for the economy's ability to adapt and establish new technologies.

Robert (1999) presented a modified version of the classical Solow production function, where human capital is included in a quite simple way. The outcome is a function of physical capital K , human capital H and the amount of labor increasing technical progress. In this production function, human capital is directly linked to the amount of labor driving technological progress. The results of questioning technological progress as driven by exogenous forces opened the way for endogenous views to the classical Solow production function where education plays an important role in driving innovation and increasing productivity both directly and indirectly.

Several studies also discussed the relationship between gender equality in education and its effects on economic growth. According to available research results, gender inequality in education has a substantial effect on economic growth in both direct and indirect ways (Klasen, 2002). Some authors argue that there is a larger economic benefit from educating females than males, and that the countries willing to expand their economic growth, should put effort in investing in women's human capital, especially education (Schultz, 2002).

For example, Schultz (2002) argued that investing in female education produces more marginal returns than for males and generates externalities which can benefit economic growth. According to the author, such externality is that females with higher education tend to do more paid work than males, resulting in more taxes. Schultz also claimed that parts of the world which have successfully encouraged equal educational attainments for males and females, have also achieved large economic progress.

Klasen (2002) has examined the relationship between gender inequality in education and economic growth using cross-country panel data. His analysis showed a negative impact of gender bias in education on a long-term economic growth. He argued that gender inequality decreases human capital in the society and by that has a negative effect on economic growth.

Thévenon et al. (2012) discussed another issue of gender inequality and its effect on economic growth. The authors claimed that children of different genders have similar abilities, and that children with higher abilities probably get better education by attending better schools and achieving higher level of education. The gender inequality indicates that boys receive better education than girls, leading to the fact that boys even with lower abilities get better education than girls with higher abilities. This affects the level of the human capital negatively by excluding girls with high abilities from attending school and possibly from participation in the labor market.

Goldin (1995) observed an increase in female labor force participation compared to male, when there was an increase in female education. The author showed that female labor participation has been u-shaped through the past century of the economic development. The u-shaped curve described in her study represented the relationship between female labor force participation rate and economic development on y-axis, and GDP per capita is on the x-axis. Goldin claimed that when incomes on the labor market are low, female labor force participation is high. Furthermore, when the incomes rise, for example due to a new technology, female labor participation decreases and females often do much unpaid work, for example household work, which does not decrease the number of their working hours. However, when an advance in female education is present, they come back into the labor force, which is clearly seen along the movement of rising part of the u-shaped curve. Goldin's findings showed that the rise in women's labor force participation was probably due to an increase in female education, which made it possible for women to get more prestigious jobs, as their time became more valuable on the labor market, and cause an increase in the substitution effect and the decrease in the income effect.

4. Data

The data used in this thesis is a cross-country panel data collected from the World Bank database. Over a period of 29 years, the following 16 European countries were considered: Austria, Belgium, Cyprus, Finland, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey and United Kingdom.

The observations were obtained for each country over the period 1981-2010, which yield the sample comprising 464 observations. The data includes such variables as GDP growth, percentage change in female tertiary enrollment in education and percentage change in female labor force participation. We have used the educational and labor participation data in percentage changes, since we are interested in studying growth rates. There are some few missing values in our dataset for some of the countries, therefore 444 observations have been used in statistical analysis.

The variable GDP growth is a percentage growth rate measured annually, and is defined as the aggregated value of all the products and services produced in the country.

The variable Education, (female enrollment in tertiary education), shows a percentage of female population that has enrolled in tertiary education, which is defined as a level of education that requires a completed secondary education, regardless of age.

The variable Laborpart, (female labor force participation rate), is defined as percentage of female population participating in the labor force, from the age of 15 and upward. By labor force participation we mean a part of the population, employed or actively looking for an employment, in other words, that is economically active.

It is important to note that we are aware of the possible causality problem in this study. Female enrollment in tertiary education and labor force participation might lead to economic growth, although there is similarly a chance that it is the economic growth that leads to higher labor force participation and enrollment in education. The weakness of the data might also be that the countries studied in this thesis are very similar to each other

in terms of female enrollment in education. Namely, the enrollment in tertiary education in European countries is quite high.

4.1 Annual growth rates

As seen in Figure 1 below, growth rates have fluctuated between years 1981-2010. For most of the years, the studied countries have experienced positive growth rates, but there have been some years of negative rates too. For example, in 1992-1993 we see a downward trend with growth rates. However, the largest drop in growth rates is around 2009, which we expect to be due to the latest economic crisis. This is followed by a rapid increase in growth rates for all the countries in 2010.

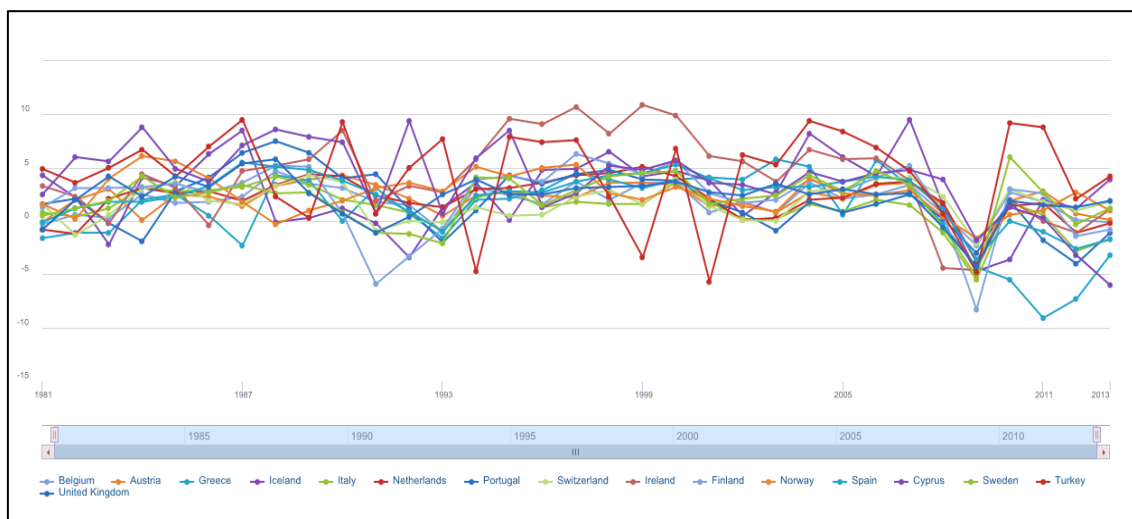


Figure 1. Annual growth rates for 16 European countries.

4.2 Female enrollment in tertiary educational activities

Studying data for female educational enrollment, we can recognize an almost constant, upward trend during the study period. Despite some fluctuations and missing values for Turkey, Cyprus and Iceland, we see rapid increases for tertiary educational enrollment in the countries under consideration. However, we can see clear differences between countries concerning the number of females taking part in tertiary education. The between-country variation changes over time, for example it is quite small in 1987-1988 and larger in 2005-2006.

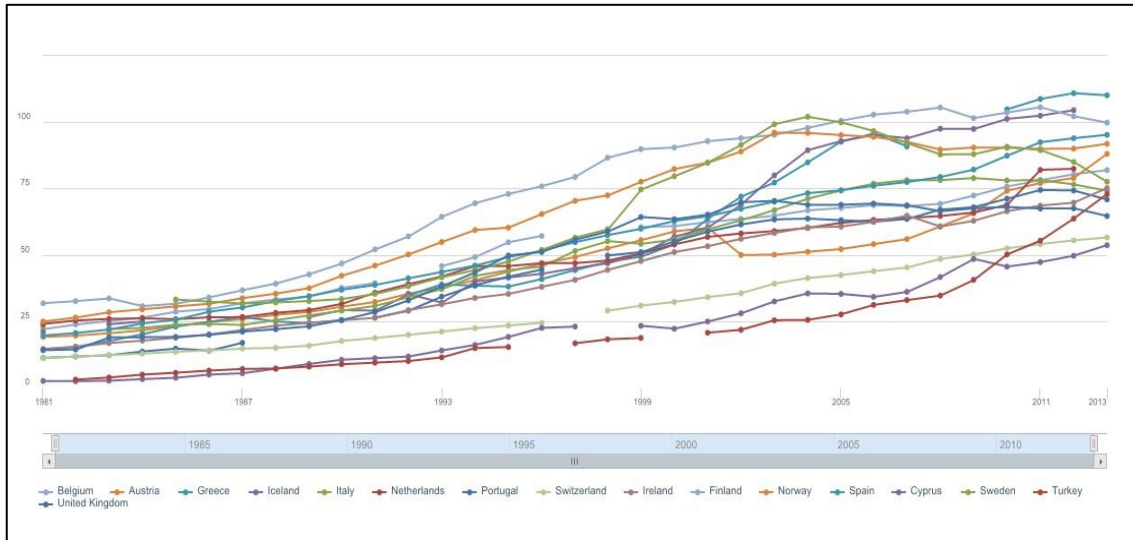


Figure 2. Female educational enrollment (tertiary level) for 16 European countries.

4.3 Female labor force participation rate

When it comes to female labor force participation rate, Figure 4 shows quite weakly increasing trend, compared to the female enrollment in education. There is also less variation between most of the countries.

The female labor participation for all countries is between 20 and 80 percent. Turkey shows the lowest levels, while Iceland shows the highest labor participation rates for women.

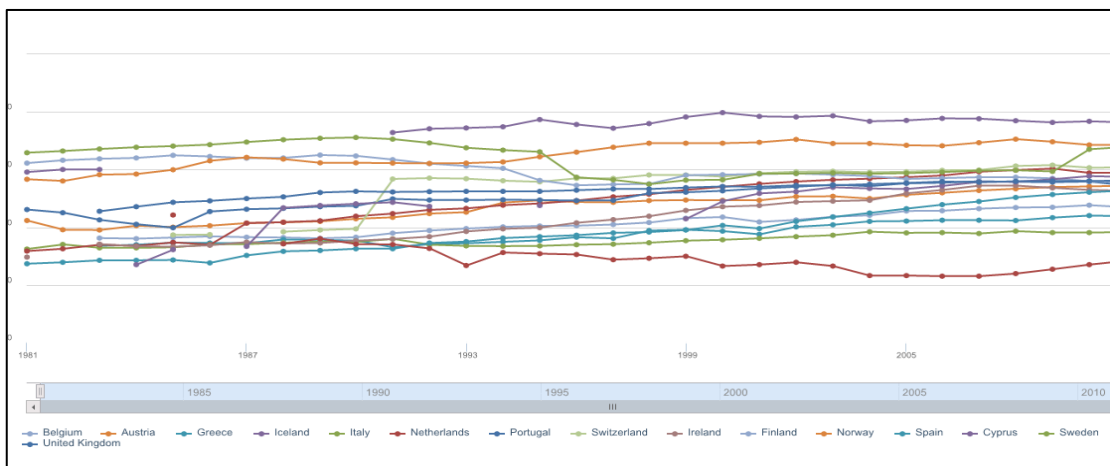


Figure 3. Female labor force participation rates for 16 European countries.

5. Method

5.1 Panel data

Panel data arises when a panel of units, e.g. countries, households are observed over a period of time during which several observations per unit are obtained (Gutierrez & Sanford, 2015).

Since we are studying panel data over time and across 16 countries, it is important to control for effects on GDP which are caused by country and year effects. There are many unobservable factors such as cultural and social policy differences between countries, hence there is a certain heterogeneity in the data.

All statistical analysis has been conducted using statistical software Stata 12.1 (Stata Statistical Software: Release 12.1). To proceed with the fixed effects regression, we firstly identified the panels and the times by using the command *xtset*. The analysis was then performed by using the function *xtreg*, a command that fits regression models to panel data, and with the option *fe*, it fits fixed effects models.

5.2 Fixed effects model

Fixed effects model used for the analysis of panel data controls for individual or time factors in panel data which might bias the outcome when conducting a regression analysis. We use country fixed effects due to the possibility of specific factors within the countries that may affect the outcome, for example there are some factors that lead to certain countries having a higher GDP-growth, such as financial stability, competitiveness and policies. We have also added time fixed effects to control for factors which change over time, but are similar for the countries, for example an economic crisis. The advantage of the fixed effects model is the simplicity and a rather easy interpretation.

5.3 Regression and econometric models

We conducted regression analysis for 3 econometric models. The first model only includes the covariate *Education* (female enrollment in tertiary education). We also have *Year* and *Country* as fixed effects in the model and ε is the random error term:

$$(1) \quad GDP\ Growth = \beta_0 + \beta_1 Education + \gamma_y + \gamma_c + \varepsilon.$$

The second model only includes the covariate *Laborpart* (female labor force participation), and can be written as the following:

$$(2) \quad GDP\ Growth = \beta_0 + \beta_1 Laborpart + \gamma_y + \gamma_c + \varepsilon.$$

The third model includes both variables of interest, *Education* and *Laborpart* and is written as:

$$(3) \quad GDP\ Growth = \beta_0 + \beta_1 Education + \beta_2 Laborpart + \gamma_y + \gamma_c + \varepsilon.$$

We understand that female enrollment in tertiary education and female labor participation might have an effect not only on GDP growth, but on each other as well. Therefore, we decided to run three different models and compare the results.

6. Results

6.1 Female tertiary educational enrollment and GDP growth

The scatter plot in Figure 4 illustrates the relationship between the GDP growth and female enrollment in education. We can see a linear relationship, although it is not very strong.

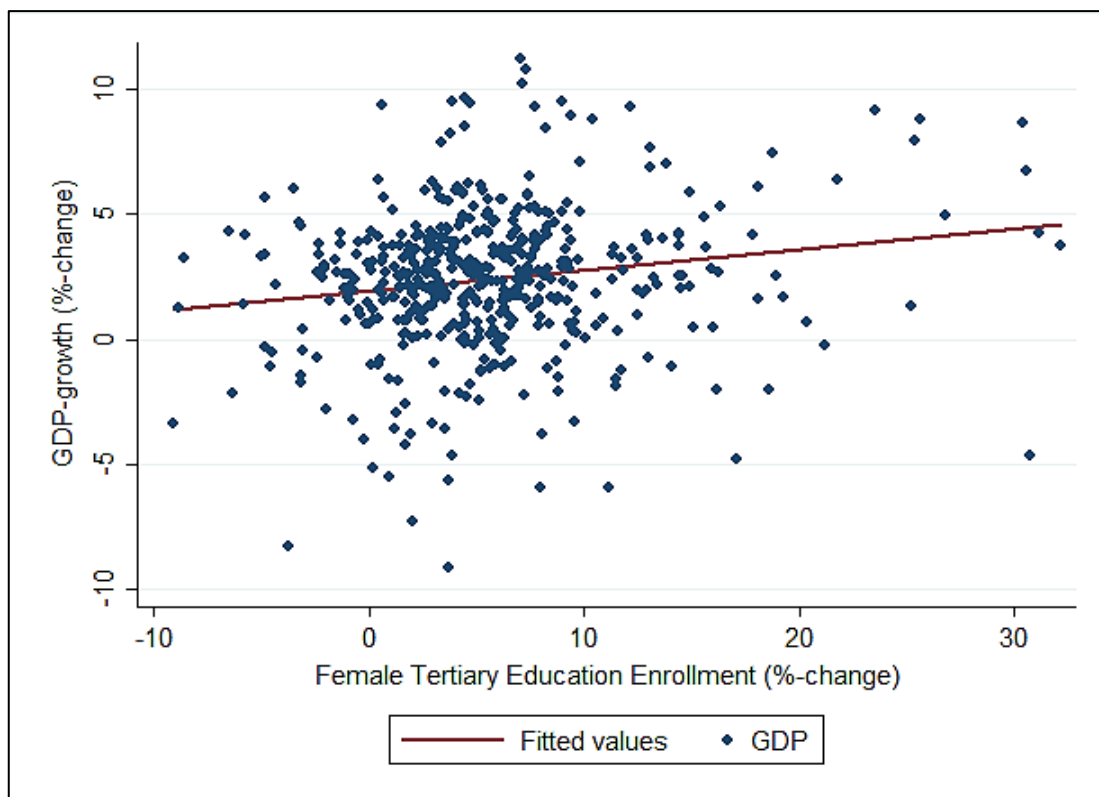


Figure 4. Relationship between GDP growth and female tertiary education enrollment.

6.2 Female labor force participation and GDP growth

In Figure 5, the scatter plot illustrating the relationship between female labor force participation and GDP growth shows that a majority of the observations for labor force participation tends to concentrate around the value zero, while the GDP growth values are varying a lot in this interval.

This is not a pattern which we expected to see, but we understand that female labor force participation is not varying much in the countries considered in this study.

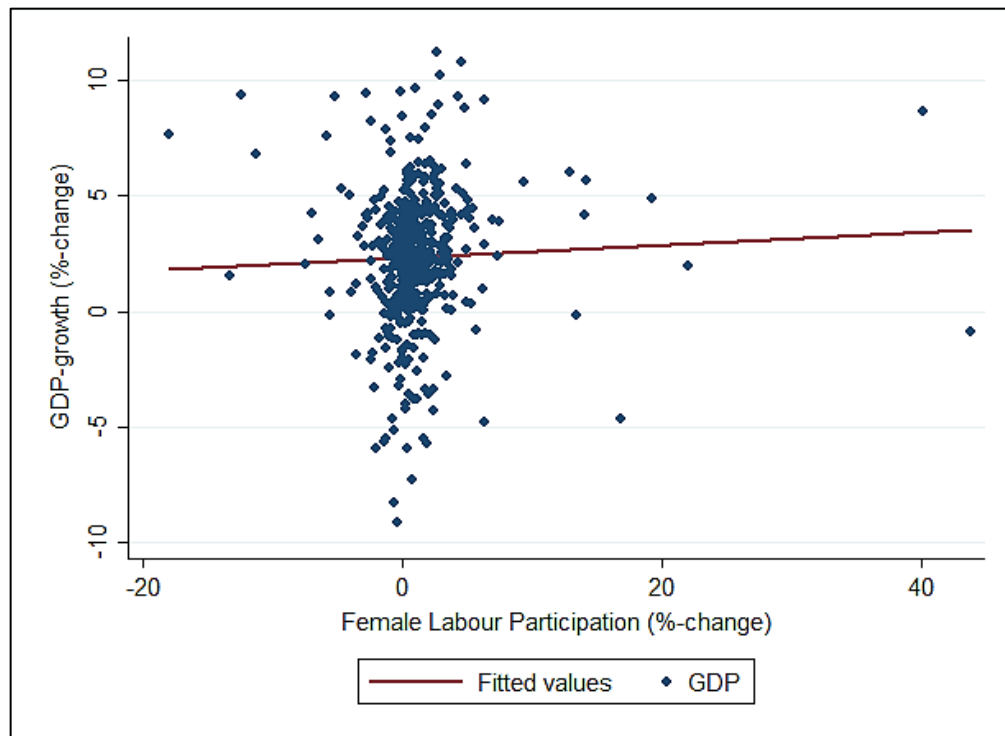


Figure 5. Relationship between GDP growth and female labor force participation.

6.3 Regression analysis

Now we present the results of the regression analysis for models (1)-(3). We start with the single regression analysis concerning the model (1), including only one variable of interest, *Education*, female enrollment in tertiary education:

$$(1) \quad GDP\ Growth = \beta_0 + \beta_1 Education + \gamma_y + \gamma_c + \varepsilon.$$

Fixed-effects (within) regression		Number of obs	=	483	
Group variable: Country1		Number of groups	=	16	
R-sq:		Obs per group:			
within	= 0.4672	min	=	24	
between	= 0.0401	avg	=	30.2	
overall	= 0.4169	max	=	33	
corr(u_i, Xb) = 0.0040		F(15,15)	=	.	
		Prob > F	=	.	
(Std. Err. adjusted for 16 clusters in Country1)					
GDP	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
Education	.0395918	.0142378	2.78	0.014	.0092446 .069939

Figure 6. Results of the single regression analysis for model (1).

In Figure 6, we find that $\hat{\beta}_1 = 0,04$ which shows a positive effect of education on GDP growth. Since p-value = 0,014, this effects is significant at $\alpha = 0,05$ level.

The second regression analysis was conducted for model (2), including another variable of interest, female labor force participation, *Laborpart*:

$$(2) \quad GDP \text{ Growth} = \beta_0 + \beta_1 Laborpart + \gamma_y + \gamma_c + \varepsilon.$$

Fixed-effects (within) regression		Number of obs	=	479	
Group variable: Country1		Number of groups	=	16	
R-sq:		Obs per group:			
within	= 0.4627	min	=	20	
between	= 0.0516	avg	=	29.9	
overall	= 0.4154	max	=	33	
corr(u_i, Xb) = -0.0124		F(15,15)	=	.	
		Prob > F	=	.	
(Std. Err. adjusted for 16 clusters in Country1)					
GDP	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
Laborpart	-.0001505	.0566143	-0.00	0.998	-.120821 .1205199

Figure 7. Results of the single regression analysis for model (2).

The regression for *Laborpart* (see Figure 7) shows that $\hat{\beta}_1 = -0,0002$ is negative. However, the result is not significant, p-value = 0,998.

We continue with the multiple regression analysis concerning the model (3), including both variables of interest, which are female enrollment in tertiary education, *Education* and female labor force participation. *Laborpart*:

$$(3) \quad GDP \text{ Growth} = \beta_0 + \beta_1 Education + \beta_2 Laborpart + \gamma_y + \gamma_c + \varepsilon.$$

The regression coefficient for *Education* (see Figure 8) $\hat{\beta}_1 = 0,037$ indicates that we have a positive effect of education on economic growth. However, the effect of education is non-significant since the p-value = 0,11.

For female labor force participation, we obtained the coefficient $\hat{\beta}_2 = 0,003$, indicating a positive but also non-significant effect, p-value = 0,959.

Fixed-effects (within) regression		Number of obs	=	444		
Group variable: Country1		Number of groups	=	16		
R-sq:		Obs per group:				
within	= 0.4810			min	=	20
between	= 0.0008			avg	=	27.8
overall	= 0.4302			max	=	33
corr(u_i, Xb) = -0.0165		F(15,15)		=	.	
		Prob > F		=	.	
(Std. Err. adjusted for 16 clusters in Country1)						
GDP	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Education	.0368587	.0217008	1.70	0.110	-.0093954	.0831128
Laborpart	.0030528	.0578555	0.05	0.959	-.1202633	.126369

Figure 8. Results of multiple regression analysis for model (3).

7. Discussion

We conducted the analysis of panel data using three models (1)-(3). We obtained a significant result for model (1), when we had education as a single covariate. It was expected from the previous research to discover a significant positive effect of education on economic growth, such as claimed by Uzawa (1965) and Lucas (1988), who argued for the positive effect education has on technological change and the productivity of the labor. Klasen (2002) showed a similar result, by presenting a negative relationship between gender inequality in educational activities and economic growth. It is also consistent with our theoretical expectations, where we assumed education to effect growth in two ways, through increasing the productivity of the labor and through driving new innovations and technological progress.

Even though educational enrollment might influence economic growth in a positive way, there is a great possibility of GDP growth having an effect on educational enrollment as well. Due to the possibility of receiving a biased result caused by simultaneity it's of importance to discuss the coefficients in terms of associations and not as causal effects.

The results from the two other regression models were not significant, since the covariates in them were negligible. One explanation could be presence of unobserved factors, which influence both economic growth and labor. This was not what we expected to find, relying on the theoretical base, where we assumed the economy to be partly driven by increases in population growth and thereby in the labor force. We do realize that labor force participation rates are determined by several factors, both globally and within a specific nation. In the same way, economic growth is most likely also be determined by numerous variables not included in our model.

It is important to outline the limitations of our study. Firstly, the sample size is quite small. We might have seen another trend by studying a larger sample of countries over a longer time period. Secondly, we have not taken technological progress into account in our empirical research, even though it is one of the fundamentals for economic growth in the Solow growth theory. Theoretically, technological progress can increase the productivity to the point that we can produce a greater quantity with the same amount of

labor. If we would have looked at the evolution of technology during the studied time period, we might have received some information about a weak almost non-existing relationship between labor force participation and GDP growth in our sample.

The positive significant findings from the model (1) are in line with empirical results from similar studies. Even though the regression coefficient of educational enrollment is small, it does state a positive relationship between the dependent and the independent variable. This result makes it possible for us to give an answer to our first research question: we do see a small positive association between female educational enrollment and GDP growth. As for our second research question, we did not receive empirical evidence stating a positive association between labor force participation and GDP growth, despite previous researchers who were able to show a positive relationship.

8. Conclusion

This thesis attempts to examine the relationship between female tertiary educational enrollment, labor force participation and economic growth by studying panel-data for 16 European countries. We analyzed the data by using three fixed effects regression models. The first model, including only educational enrollment as variable of interest, the second one includes only labor force participation and the third one includes both variables of interest.

From the first model (1), we received a small, but positive coefficient for female educational enrollment. This states a significant association between the educational enrollment and GDP growth. From the second model (2), we received a small negative regression coefficient for female labor force participation, yet non-significant due to a high p-value. From the third model (3), including both variables of interest, the coefficient on educational enrollment is positive and close to be significant. As for the coefficient of female labor force participation, it is positive but non-significant. When running separately single regression models and the regression model including both variables of interest, we received different coefficients for female labor force participation. This shows a possibility of female educational enrollment and labor force participation not only to be associated with GDP growth, but with each other as well.

In this study our first research question was whether female educational enrollment is associated with GDP growth. From the results of our empirical study, we see a positive significant association between female educational enrollment and GDP growth. Our findings indicate that more female taking part in higher educational activities can influence economic growth in a positive way.

Due the theoretical base of this study, education is assumed to affect growth both directly through increasing the productivity of the labor and indirectly through driving technological progress. The results from the statistical analysis is consistent with this, as well as with findings from research regarding the same topic such as Uzawa (1965), Lucas (1988), Klasen (2002) and Shultz (2002).

The second research question was whether female labor force participation is associated with GDP growth. From the study conducted in this thesis, we did not find any significant result that showed a positive relation between labor force participation and GDP growth. Many of the previous studies with findings concerning a positive effect of female labor force participation on GDP growth have mainly been performed using data from developing countries during time periods when the countries probably have been experiencing substantial changes in female educational and labor activities. If we would have used a broader range of countries in our analysis and possibly over a longer time period, the obtain result might have been different.

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