

ZURICH UNIVERSITY OF APPLIED SCIENCES
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Bachelor Thesis

Shaping the World - Why Do Female Students Graduate
More Often than Male Students in OECD Member States?

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Management Summary

Across OECD countries, girls and young women often outperform their peers in educational attainment, and in testing achievements in almost all educational levels. This bachelor thesis investigates driving forces behind the phenomenon including variation between OECD member states and field of study.

Since the issue of gender equality has arisen, the phenomenon of gender gaps in general has become increasingly relevant. Gender gaps in education and income are strong indicators for equality in a country's society, which in turn delivers greater growth and inclusiveness. Although there are already several empirical studies about the growing gender gap in education in OECD member states as well as in other countries around the globe, it has been little empirical research done about the driving forces behind the phenomenon.

For the purpose of this current thesis, secondary literature and expert knowledge were interpreted and processed. The already existing studies which provide an explanation of the growing gender gap in education come with potentials and constraints. Potentials of the empirically researched approaches were used and research was continued where the constraints are. In addition, few qualitative interview questions were sent out to educational institutions in several OECD countries to further interpret the phenomenon.

The findings of this current bachelor thesis are in line with the few existing approaches. Mostly external, societal and economic factors were found to be driving forces behind the reversal of the gender gap in education and any variation across OECD countries. Whereas the interaction of external and internal factors explains why there is any female educational advantage possible at all. Against all odds, performance was not found to be responsible for gender variation in the field of study, rather motivation accounts for a bulk of gender differences in certain specialties.

The complexity of the phenomenon requires further ongoing research. In addition, it is believed that the increasing female advantage in educational attainment indicates a dynamic change for a country's economy. Qualitative or quantitative research about the implication of the increasing gender gap in education on society is therefore recommended.

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1 Introduction

From oppression and discrimination in educational institutions less than a century ago, women have claimed schools and colleges for themselves (DiPrete & Buchmann, 2013; Quenzel & Hurrelmann, 2013; van Hek, Kraaykamp & Wolbers, 2016). Among OECD countries, girls and young women often outperform their peers in education systems, both in terms of educational attainment and in testing achievements (OECD, 2017, p. 15). On OECD average, more young women than young men are likely to graduate from a tertiary education. Around 42% of women under 30 years old are expected to graduate with a tertiary degree, while the expectation for men under 30 years old amounts only 29% (OECD, 2018a, p.211).

The gender gap varies significantly across the field of study. In 2013, approximately 64% of bachelor's degrees in education, humanities, and social sciences were obtained by women, compared to only 31% of the bachelor's degrees in sciences and engineering. This gender gap in bachelor's degrees across the field of study correlates with career expectations among 15 years old students. Career choices in early years are believed to significantly contribute to a gender wage gap (OECD, 2015a).

There is further variation among the different OECD member states. In 33 out of 36 countries, women are more likely to graduate with a bachelor's degree in their lifetime, only in Japan, Switzerland and in Germany men are expected to outnumber their counterparts (OECD, 2016).

Although there are already several literatures about the growing gender gap in education in OECD member states as well as in other countries around the globe, it has been little empirical research done about the driving forces behind the phenomenon. Apart from a few authors such as Quenzel and Hurrelmann (2013), DiPrete and Buchmann (2013), and van Hek et al. (2016) who discussed reasons for the increasing gender gap in educational attainment with different approaches, there are not much more relevant empirical studies available that would shed light on the topic.

This current bachelor thesis investigates the driving forces behind the increasing gender gap in education with a female advantage by answering the following research questions:
Main research question 1: What are driving forces behind the phenomenon?

Research question 2: Why is there a variation between different OECD member states?

Research question 3: Why is there a variation between the field of study?

1.1 Scope

The term “OECD countries” refers to the countries with membership in the Organization for Economic Co-operation and Development established in 1961 with its headquarters in Paris, France. Today, the 36 member countries span the globe, from North and South America to Europe and Asia-Pacific. There are currently 36 members, which include many of the world’s most advanced countries, but also emerging countries such as Mexico, Chile, and Turkey (OECD, 2019a). For the purpose of this bachelor thesis, the focus is on the overall average of educational attainment, only to answer the research questions 2 and 3 differentiation between countries and field of study was done.

The term “graduation” is further defined as graduating from a tertiary education level such as short-cycle tertiary, bachelor or equivalent, master or equivalent, and doctoral or equivalent education level. This current thesis refers to the International Standard Classification of Education (ISCED) Level 5 to 8 established by UNESCO (2012). All other educational levels were not investigated. In addition, no division was done between native-born and foreign-born students in a country. The population was taken as a whole, and therefore not further subclassified.

1.2 Methodology

The current bachelor thesis is mainly using primary and secondary data. All information in the literature review and theoretical framework is based on secondary data summarized and divided into different sections. This is done in order to provide ease of reading and understanding of the given material. Secondary research is the data collected by other authors and not directly by the analysts themselves (Rabianski, 2003). The theoretical framework is based on international literature, and whenever possible, refers to OECD countries.

In addition, key findings from existing literature about the reasons behind the growing gender gap in education were used to further investigate this topic. The already existing literature about driving forces behind the phenomenon consists of potentials and constraints. Potentials of the empirically researched approaches were used, and research was continued where the constraints are.

Primary data was collected and analyzed using a qualitative methodological approach. Semi-structured interviews with experts from education research institutions were conducted to investigate the research questions in this chapter. The following institutions were questioned: European Educational Research Association (EERA), United Nations Educational, Scientific and Cultural Organization (UNESCO), and Gottlieb Duttweiler Institute.

Semi-structured interviews were chosen because they provide an open framework that enables mutual communication (Laforest, 2009). This kind of interview requires a qualitative research approach, and aims to tell the story of a particular group's experiences in their own words (Statistics Solutions, 2019). Semi-structured interviews allow the interviewee to answer in a flexible manner, and go into details if further explanation is needed (Laforest, 2009).

After having collected the data from the interviews, explanation by defining main themes and ideas was derived. Ideas and themes from the interviews as well as key takeaways from the existing theory provide the data basis for the findings. Eventually, findings were integrated into an explanatory model in order to discuss, and answer the initial defined research question.

2 Literature Review

In this chapter, existing research on the increasing gender gap in education was examined and analyzed. The already investigated approaches consist of potentials and constraints. The potential of the empirically researched approaches was used, and research was continued where the constraints are. The following literature was selected because of its relevance to the scope of this current bachelor thesis.

2.1 The Growing Gender Gap in Education by Quenzel and Hurrelmann (2013)

Quenzel and Hurrelmann (2013) reviewed international literature on gender in education, and focused research on two existing approaches (return on investment and role model approach) as well as on socialization theory in order to explain the phenomenon. Findings were introduced and discussed in a developed model.

The return on investment approach describes the long-term advantages of investment in education. Nowadays, young women invest a considerable amount of money and time in education because of professional careers and familial ambitions that society expects of them. Young men, on the other hand, do not actively make use of this approach because they traditionally benefited from the performance mechanism (Diprete & Buchmann, 2006).

According to the role model approach, it is the lack of male role models in the whole educational process that leads to the gender gap. Male teachers are believed to be a crucial requirement for successful integration of young men into the learning culture. Although it cannot be assumed that female teachers disadvantage their male students, a female dominated education system leads to greater motivation for girls than for boys (Skelton, 2003, p. 201).

Quenzel and Hurrelmann (2013, p. 73) introduced the socialization theory, which focuses on the concept of developmental tasks by Havighurst (1972). Developmental tasks describe challenges which a person in every stage of life has to fulfill in order to take a role in society.

The four central clusters of developmental tasks are described by Quenzel and Hurrelmann (2013, p. 73-74) as the following:

“Qualification: the expansion of intellectual and social competence in order to meet the demands of responsible educational, and finally, professional requirements with the goal

of obtaining gainful employment and therefore securing an individual economic basis for an autonomous adult existence.

Social attachment: the acceptance of bodily changes, social and emotional detachment from parents, the development of a gender identity and of attachment to peers, and the development of a sexual relationships, which can potentially be the basis for planning a family and the birth and nurture of one's own children.

Regeneration: autonomous behavior patterns for the use of the consumer commodity market, including the media, in order to develop the ability to deal with money, with the goal of developing an individual lifestyle and controlled and needs-oriented interaction with leisure activities.

Participation: the development of an autonomous value and norm orientation and an ethical and political conscience that is in line with the individual's behavior and actions."

Studies reviewed by Quenzel and Hurrelmann (2013, p. 79) support their central assumption that girls and young women have been more likely to successfully deal with youth phase developmental tasks for about three decades. Some of the studies further suggest that difficulties in dealing with the three developmental tasks "regeneration", "social attachment", and "participation" have an impact on the developmental task "qualification".

Quenzel and Hurrelmann (2013, p. 80) developed an explanatory model outlined in Figure 1. The model explains the relationship between success at school, the different clusters of developmental tasks, and the initially investigated approaches. The developmental task "qualification" is on focus, which contains the development of intellectual and social competences. The three other clusters of developmental tasks are claimed to have crucial impact on the task "qualification". The return on investment as well as the role model concept were introduced as intervening variables.

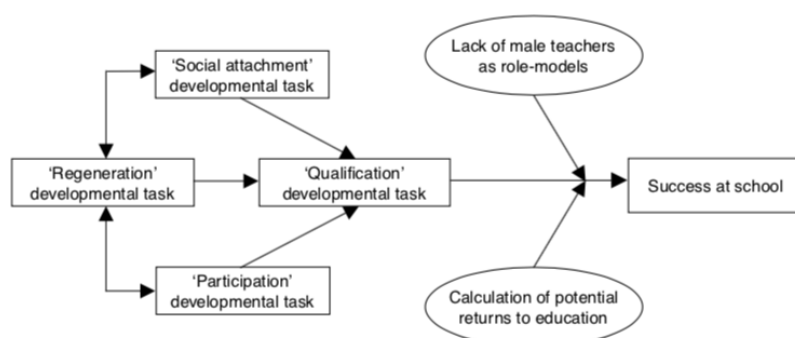


Figure 1: Explanatory Model (Quenzel & Hurrelmann, 2013, p. 79)

2.2 Comparing the Gender Gap in Educational Attainment by van Hek et al. (2016)

Van Hek et al. (2016) analyzed contextual factors that affect the educational attainment of both, women and men, for birth cohorts between 1950 and 1982 in 33 different Western countries. Explanatory variables for a varying gender gap over time and among countries are expected to be female labor participation as a role model function and an emancipatory environment indicated by the degree of religiosity. Female labor participation, as well as an emancipatory environment with a low level of religiosity, are suggested to enhance female educational attainment.

To test their hypotheses, van Hek et al. (2016) applied data (n = 138 498) from 6 different waves of the European Social Survey and the US General Social Survey (2002–2012), and calculated correlation between the growing gender gap in education and the mentioned variables.

Figure 2 shows that female labor participation has a different effect on women and men. Women growing up in the country with the highest level of female labor participation attend school approximately half a year longer than women growing up in the country with the lowest level of female labor market participation (van Hek et al., 2016, p. 272).

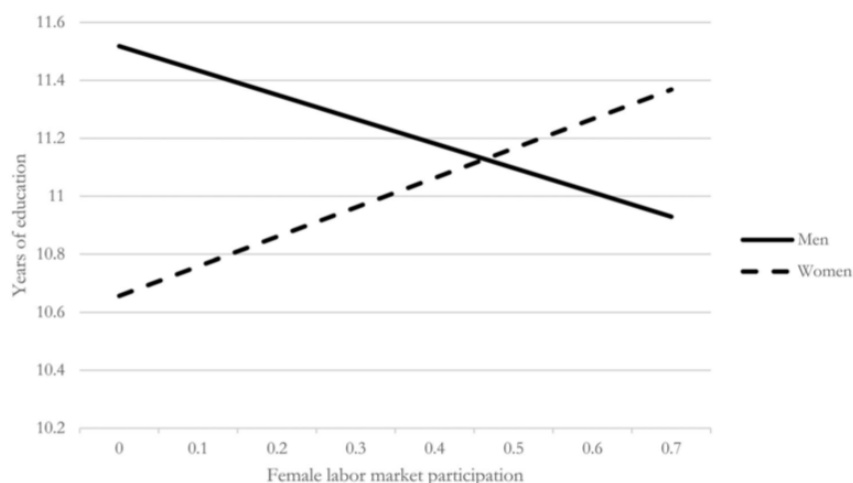


Figure 2: Effect of Female Labor Market Participation on Years of Education (European Social Survey, 2002-2012; General Social Survey, 2002-2012)

According to results in Figure 3, religiosity has a negative effect on both gender in terms of educational attainment. However, the negative effect on girls is greater.

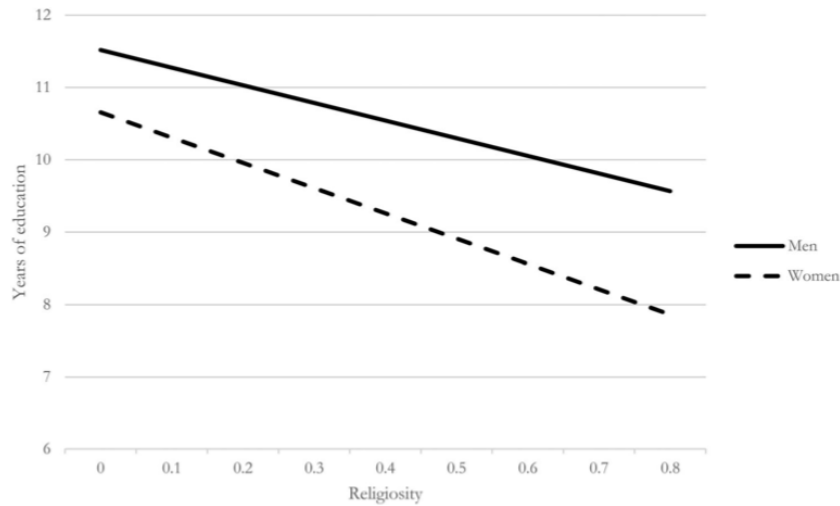


Figure 3: Effect of Religiosity on Years of Education (European Social Survey, 2002-2012; General Social Survey, 2002-2012)

2.3 The Rise of Women by DiPrete and Buchmann (2013)

DiPrete and Buchmann (2013) examined the rise of women in education with a focus on the United States and the following three aspects of the phenomenon. First, women have not only gained equality in educational attainment, but they have also outnumbered their male counterparts. Second, women have overtaken man on average in the total number of college degrees, however, large variation in the field of study have remained. Third, the gender gap differs significantly by race and ethnicity.

As represented in Figure 4, black females have held the lead in educational attainment over black males for decades, and like white women, black females are increasing their educational advantage. As a result, the racist gap in college completion has been much larger for black males than for black females (DiPrete & Buchmann, 2013, p. 40).

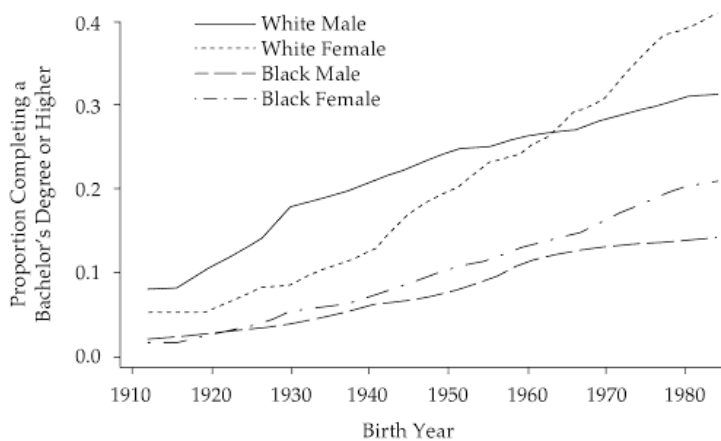


Figure 4: Proportion of 26-28 Year-Olds with Bachelor's Degree by Race and Gender (Ruggles, Trent, Genadek, Goeken, Schroeder & Sobek, 2010; U.S. Census Bureau, 2010)

The graph left in Figure 5 displays dissimilarity rates for gender by field of study, which on average are declining (all fields of study apart from Science). The index of association in the right graph indicates the factor by which females are underrepresented in a particular field of study. This index is not affected by a change in the overall share of students in a specific specialty, which is essential because attractiveness of science, technology, engineering, and mathematics (STEM) fields has changed drastically (DiPrete & Buchmann, 2013, p. 43).

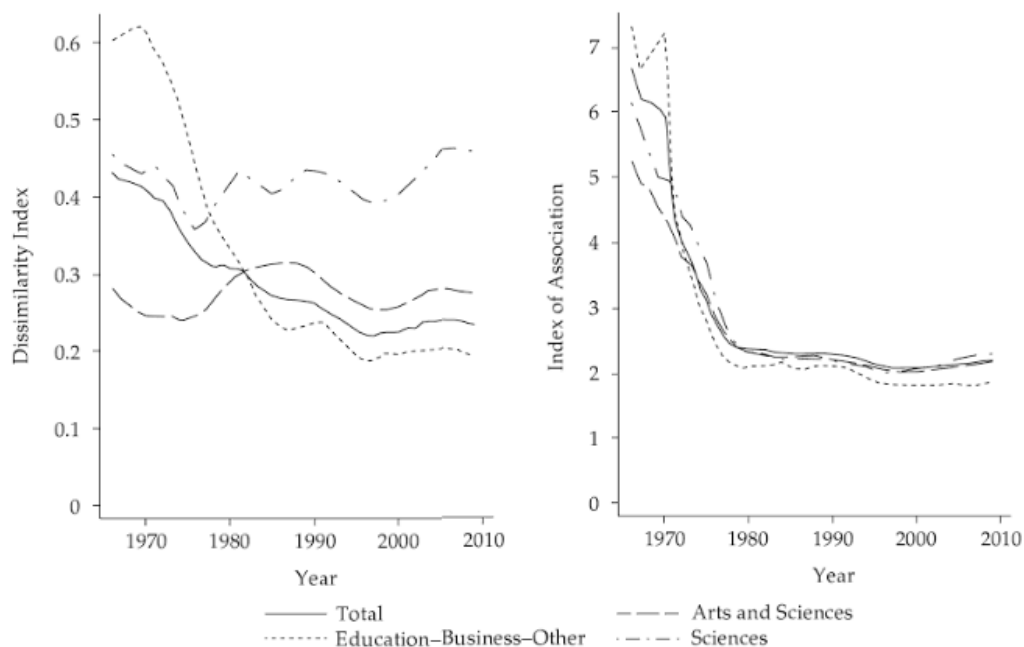


Figure 5: Gender Segregation in Fields of Study (Mann & DiPrete, 2012)

After defining the scope of their research, DiPrete and Buchmann (2013) approached the phenomenon by analyzing two different overall factors that are suggested to be driving forces behind the increasing gender gap in education. First, macro-social changes were analyzed with a focus on the changing role of women in American society and the growth in labor market opportunities for college-educated workers. Second, factors during student life course such as family, peers, and schools were investigated.

In order to shed light on the phenomenon, DiPrete and Buchmann (2013) reviewed existing literature and combined it with several analyses undertaken in collaboration with former graduate students. In addition, numerous panel data sets were analyzed including studies in which students of different age groups have been surveyed continuously over time.

2.3.1 Conclusion of Macro-Social Factors

In the 20th century, incentives for gaining higher education increased for both gender, and shaped labor market opportunities in general. Among bachelor's degree graduates, black men were largely underrepresented in high-status male-dominated employments, these were in general available only to white men. In contrast to men, there were no large race differences in terms of profession among former female bachelor students reported. Most college-educated women worked as teachers or as nurses regardless of their race (DiPrete & Buchmann, 2013, p. 58).

Increasing female labor participation in the 20th century, especially in occupations that require some form of higher education, is claimed to significantly affect the increasing female gender gap in education. Figure 6 shows a clear pattern of increasing female labor participation, and further indicates higher employment rates for black women than for white women. The high unemployment rate of black men, the lower income of black families, and a higher social work acceptance of black women gave them a greater incentive to be employed (DiPrete & Buchmann, 2013, p. 59).

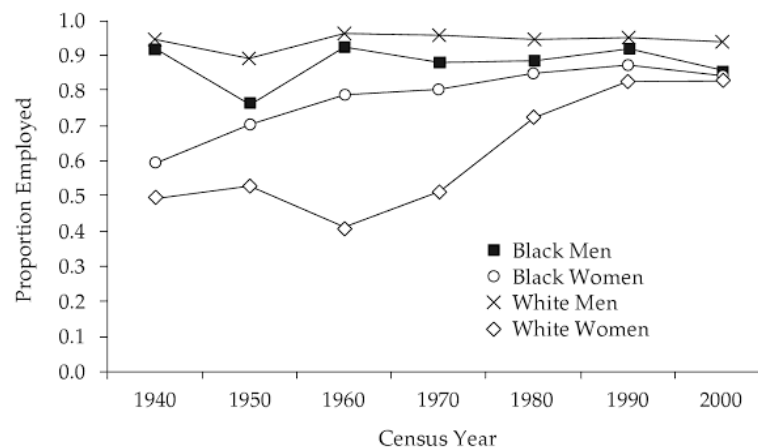


Figure 6: Percentage of 28-32-Years-Old Employees with a Bachelor's Degree (McDaniel, DiPrete, Buchmann & Shwed 2011)

Returns on investment in higher education for women and men go beyond returns from the labor market. It also includes a higher probability of marriage, a higher standard of living, and greater insurance against poverty. Women's investments in higher education have risen faster than those for men (DiPrete & Buchmann, 2013, p. 68).

An environmental factor that hinders boys to complete or even go to college was suggested to be military service. On the one hand, attendance in military service did not increase in the decades when men started falling behind in terms of educational attainment

(Office of the Under Secretary of Defense for Personnel and Readiness, 2012). On the other hand, evidence shows a negative correlation between military service and rates of college completion (MacLean, 2005).

2.3.2 Conclusion of Factors during Students Life Course

As outlined in Section 3.2.3, there was a relatively small gender gap in standardized test results measured. Analyzing data from six U.S. national probability samples from 1960 to 1992, a stability in the gender gap in reading favoring girls, and a declining mathematic performance gap favoring boys was found (Hedges & Nowell, 1995).

Although there are small gender differences in standardized tests, a large female advantage in academic performance was measured by grades. Figure 7 shows self-reported grades from October 2006 to July 2007 by high school students born in the years of 1980 to 1984. Even though high school grades are not a perfect indicator for college suitability since students choose different courses (some take more demanding courses than others), a clear pattern is recognizable in the figure below (DiPrete & Buchmann, 2013, p. 96).

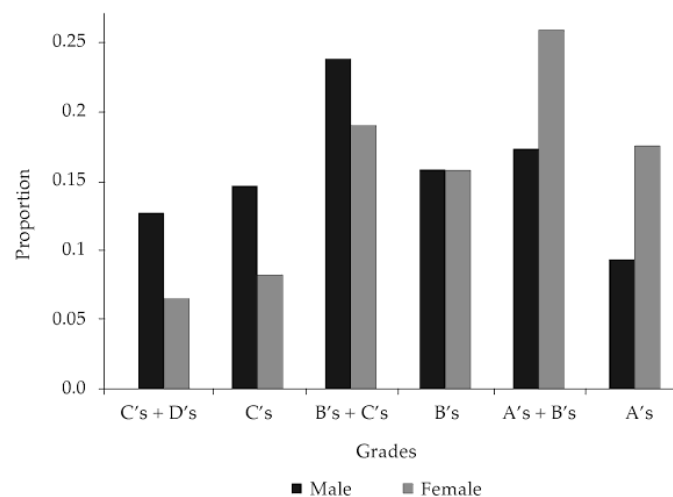


Figure 7: Distribution of Self-Reported Grades in High School (U.S. Department of Labor, 2010)

Cognitive test results and teacher evaluation show that girls hold the lead in social and behavioral skills. This is suggested to be the reason for girls' rapid gains in reading and mathematics competence during elementary school. Teachers were asked to rate social and behavioral skills such as self-control, approaches to learn, and interpersonal skills periodically from the beginning of kindergarten to the end of fifth grade. Girls achieved

higher rates in social and behavior skills than boys throughout the whole measured period (DiPrete & Buchmann, 2013, p. 103).

Girls are more keen on taking voluntarily preparatory courses, and show on average more effort at schoolwork than boys. Figure 8 represents the self-reported time spent on homework by 12 to 14 year old students in 1997. It is believed that the time spent on homework has a significant effect on high school grades (DiPrete & Buchmann, 2013, p. 108).

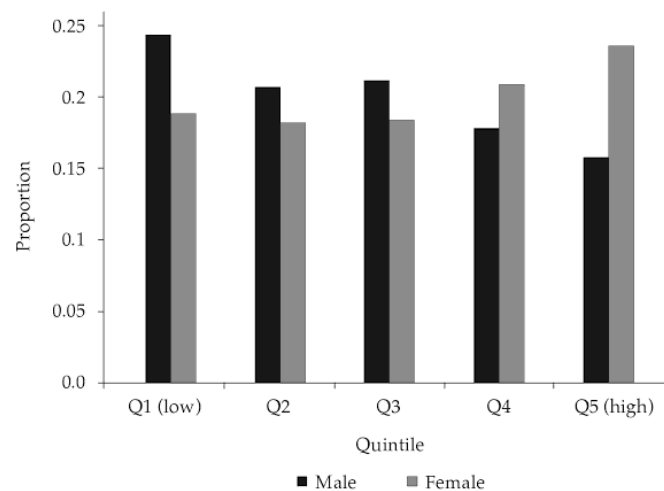


Figure 8: Self-Reported Time Spent on Homework by 12-14 Year-Olds (U.S. Department of Labor, 2010)

DiPrete and Buchmann (2013) also examined the influence of parents' human and cultural capital on their children's educational performance. Boys' educational attainment appears to be more sensitive to the level of resources provided by their parents than girls' educational attainment. It is demonstrated in Table 1 that the relationship between parents' socio-economic status and their children's educational attainment has changed drastically.

Table 1 shows results from two different birth cohorts. One before and one after the reversal of the gender gap in favor of girls. Results in terms of parental education show that from birth cohort 1938 to 1965 boys were more likely to graduate from college in all family types, apart from the constellation when both parents had at least a college degree. Data measured for birth cohorts 1966 to 1977 show a similar pattern for the constellation when both parents had at least a college degree. College completion rates for all the other family types displayed in Table 1, have changed drastically over time and mostly to the advantage of girls (DiPrete & Buchmann, 2013, p. 124).

	Father's Education			
	High School or Less		Some College or More	
	Male	Female	Male	Female
1938 to 1965 Birth Cohorts Mother's Education				
High School or Less	20%	15%	44%	36%
N	1 341	1 639	325	363
Some College or More	39%	26%	62%	66%
N	182	238	373	427
1966 to 1981 Birth Cohorts Mother's Education				
High School or Less	15%	20%	50%	40%
N	349	416	155	171
Some College or More	34%	42%	67%	66%
N	104	135	301	320

Table 1: U.S. College Completion Rates of 25-34 Year-Olds in Relation to Parent's Education (Smith, Marsden & Hout 2010)

Furthermore, the impact of the school environment on the gender gap in educational attainment was examined. It is widely believed that the large number of female middle class teacher creates a feminine environment that disadvantages boys (Sexton, 1969; Rury, 2009). DiPrete and Buchmann (2013, p. 178) do not support that belief, and further conclude that teachers recognize gender differences in behavior and consider these in their evaluation process. In addition, the assumption of gender bias does not align with the pattern of differences in rated social and behavioral skills found in elementary school.

It is also argued that schools with strong academic climates typically reduce the gender gap by improving boys' academic performance without harming the one of girls. Student's performance is highly dependent on how the adolescent culture is shaped. If academic performance is highly valued, students are more motivated to achieve high marks. In contrast, if the adolescent culture favors non-academic outcomes such as sports and leisure time, students and especially boys perform more poorly (Coleman, 1960). DiPrete and Buchmann (2013, p. 178) conclude that a weak academic culture acted in favor of girls' educational performance.

3 Theoretical Framework

Besides existing research on driving forces behind the phenomenon and the conducted semi-structured interviews, the theoretical framework is a crucial base for the findings of this current bachelor thesis. Factors described in this chapter are believed to significantly contribute to the female advantage in education.

3.1 Socio-Economic Trends

In this section, the main socio-economic trends that occurred in the last decades were analyzed. Socio-economic changes might be a significant reason for the reversal of the gender gap in educational attainment. As shown in Figure 9, women have outnumbered men in terms of educational attainment since birth cohorts around 1960. For results in Figure 9, van Hek et al. (2016) retrieved data from 33 developed countries similar to the OECD member states, and calculated the overall average.

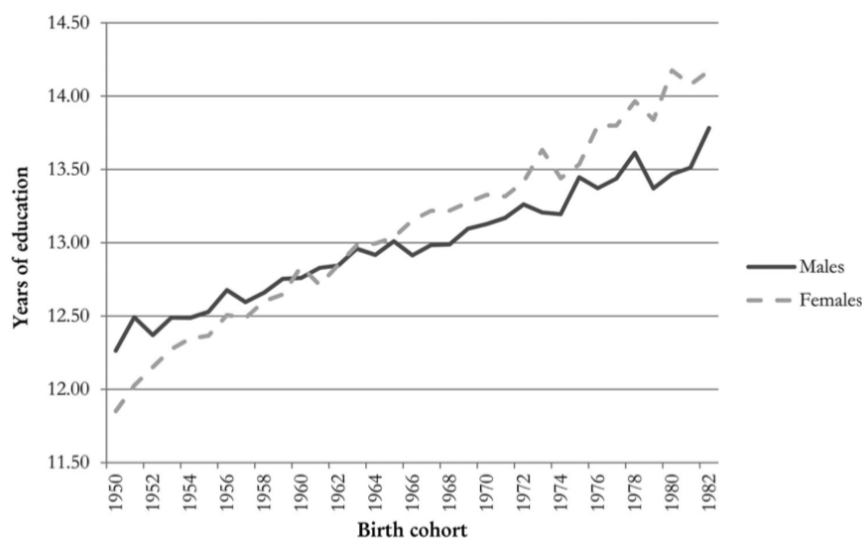


Figure 9: Over Time Development of the Gender Gap in Years of Education (European Social Survey, 2002-2012; General Social Survey, 2002-2012)

3.1.1 Globalization

Jackson (2016, p. 2) determines: “At the broadest level, globalization can be defined as a process or condition of the cultural, political, economic, and technological meeting and mixing of people, ideas, and resources, across local, national, and regional borders, which has been largely perceived to have increased in intensity and scale during the late 20th and early 21st centuries.” The phenomenon is claimed to be crucial for any large understanding of social change taking place around the world (Suarez-Orozco & Qin-Hilliard, 2004, p. 8).

Globalization led to economic restructuring characterized by new exchange relations and arrangements among nations, the increasing internationalization of trade, the increase in the proportion of part-time and female workers, and the ever-increasing financial, technological and cultural gap between developed and developing countries (Burbules & Torres, 2000).

It can be observed that globalization and the implication that comes with it, had a positive impact on reducing poverty in developing countries with open economies. In contrast, countries with inward-oriented policies suffered poor growth rates (World Bank, 2000, p. 3).

Figure 10 compares the growth rates of rich countries with growth rates of poor, open-minded, and poor, narrow-minded countries. Results suggest that greater openness to trade and investment has played an important role in promoting growth and poverty reduction in developing countries, and thus in reducing overall global inequality. (World Bank, 2000, p. 3).

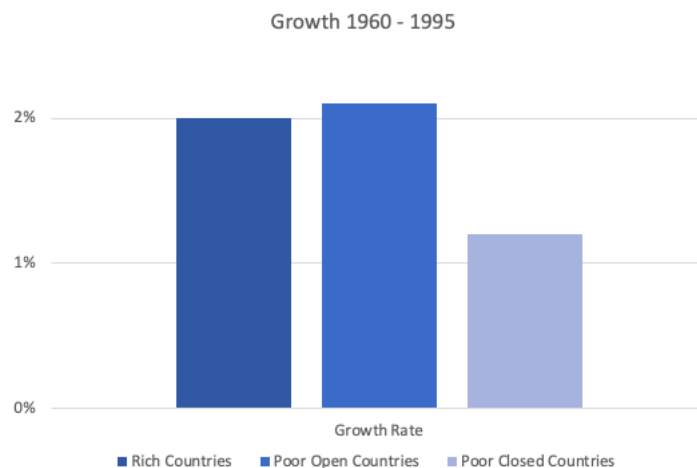


Figure 10: Growth Rate From 1960 to 1995 Compared to Openness (Ades & Glaeser, 1999)

Companies around the world have been undergoing radical change for more than two decades in order to attune to new technologies and an increasingly interdependent global economy. Many universities have adjusted similarly in order to prepare their students to new challenges attributed to cultural and political interconnection (Suarez-Orozco & Qin-Hilliard, 2004).

A major trend in education caused by globalization is the increasing convergence that can be observed in terms of academic levels and credentialing, curriculum, and assessment.

The increasing standardization of the education system makes the ongoing movement of people in education across nations more feasible (Suarez-Orozco & Qin-Hilliard, 2004).

As represented in Figure 11, the number of foreign students enrolled in tertiary education programs worldwide rose from 2 million in 1999 to 5 million in 2016. This means an average annual growth rate of 5.1% among OECD countries and 6.4% among non-OECD countries (OECD, 2018a, p. 224).

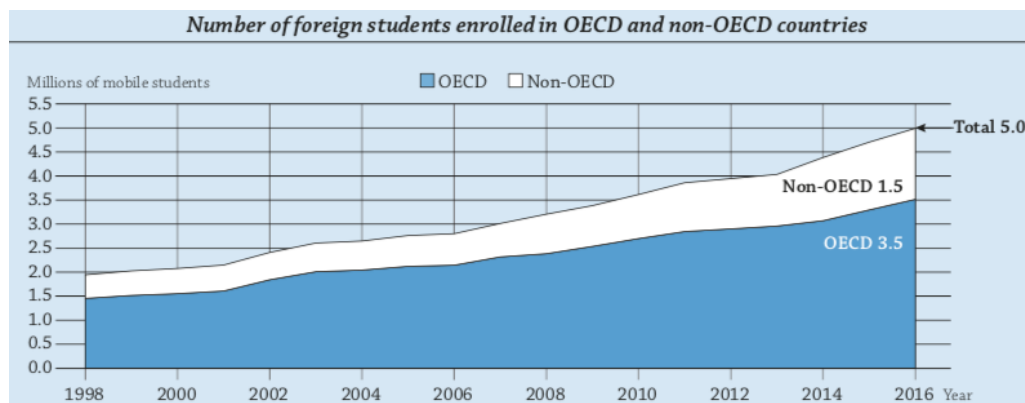


Figure 11: Growth in International or Foreign Enrolment in Tertiary Education Worldwide (UIS, 2018; Eurostat, 2018)

Stier suggests (2004) that such movement of people can influence education in a number of ways. For example, it boosts diversity, enhances specialization and the promotion of research centers, eases global employability, and increases competition.

3.1.2 Increasing Middle Class

Middle class is defined as “the large group of households that are neither wealthy nor poor, but that form the backbone of both the market economy and of democracy in most advanced societies” (Birdsall, Graham, & Pettinato, 2000, p. 1). Over the last 20 years emerging and developing economies have driven global growth and a new pattern of trade, for example, foreign direct investment (FDI) and aid flow have emerged (OECD, 2011, p. 32).

According to World Bank (2011), especially developing countries profited from global growth attributed to globalization. As a result, the amount of developing countries is decreasing. The approximation of developing and developed countries can also be observed by analyzing Figure 12 and Table 2.

World Bank (2011) defined, as shown in Figure 12, four speed-world classifications:

Affluent: Countries with high income (>9 265 Gross National Income (GNI) in 2000 for 1990s and >12 276 GNI in 2010 for 2000s)

Struggling: Countries with less than twice the high-income OECD rate of Gross Domestic Product (GDP) growth, and classified as middle-income (USD 755 to USD 9 265 GNI in 2000, USD 1 006 to USD 12 275 GNI in 2010)

Poor: Countries with less than twice the high-income OECD rate of GDP growth, and classified as low-income (USD 755 GNI in 2000, <USD 1 005 GNI in 2010)

Converging: Countries with GDP per capita growing more than twice the high-income OECD growth rate indicative of strong convergence to high-income OECD countries (>3.75% for the 1990s, > 1.8% for the 2000s)”

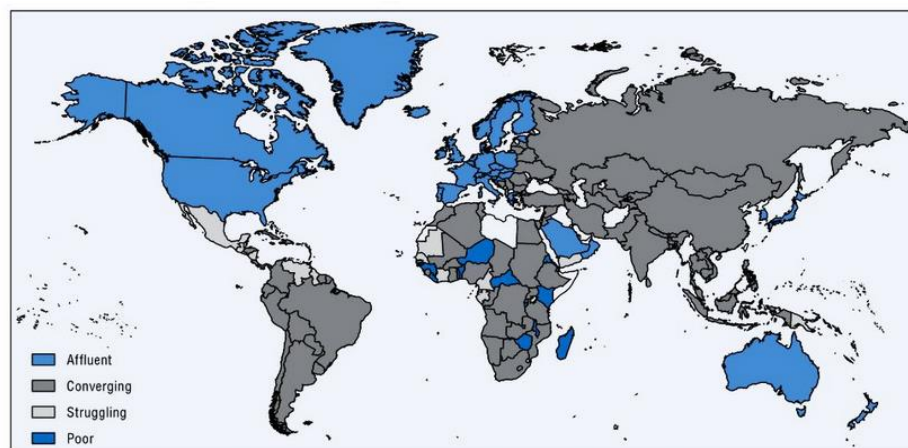


Figure 12: The Four-Speed World Classification in the 2000s (World Bank, 2011)

Table 2 shows an increasing amount of converging countries and a decreasing amount of struggling and poor countries from the 1990s to 2010.

	1990s	2000-07	2000-10
Affluent	34	40	42
Converging	12	65	83
Struggling	66	38	31
Poor	55	25	16
Total	167	168	172

Table 2: Growing Number of Converging Countries in the 2000s (World Bank, 2011)

As already observed by World Bank (2000, p. 3), globalization's effect on economic markets has generally been positive for the income groups at the tails of the distribution. On the one hand, the poor profit from a decrease in inflation and from an increase in spending on health and education. On the other hand, the rich benefit from increased

access to a wider range of consumer goods and services (Birdsall, Graham, & Pettinato, 2000, p. 1).

The shift in income is not only attributed to globalization, but also to other factors that worked in favor of emerging and developing countries. The financial crisis in 2008 slowed per capita income growth of developed countries, and enabled low-income countries to grow faster during that time period (OECD, 2011, p. 32).

Figure 13 shows a positive correlation between average income growth and average income growth of poor countries. These two variables go hand in hand and indicate that integration coming with globalization can have a strong positive impact on poverty reduction (World Bank, 2000, p. 4).

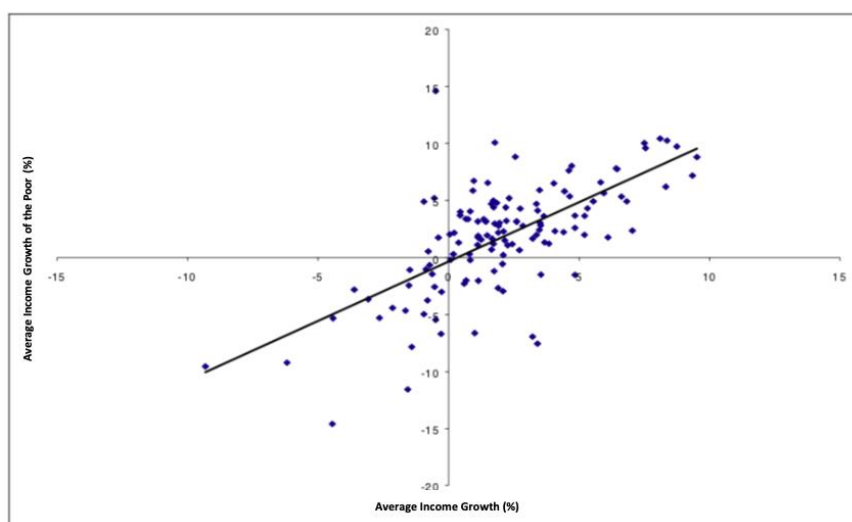


Figure 13: Correlation Income Growth of Poor and Average Income Growth (Dollar & Kraay, 2002)

Even though there has been a boost in growth in many developing countries and a shift of the middle class in general, the income gap between countries has widened. A significant number of countries are falling further behind, not only compared to high-income countries, but also to other developing countries. Reasons are believed to be a lack of openness to international trade (World Bank, 2000, p. 4).

3.1.3 Rising Importance of Education

Nowadays, more children enjoy the privilege of education than ever before. Even in developing regions, educational attainment has improved significantly over the last years. In 1950, the average amount of school years in Africa was less than two years, whereas it is now more than five years. In East Asia, years of education went from two to seven

years between 1950 and 2010. It is projected that the average years of schooling around the world are rising up to 10 years by 2050 (Patrinos, 2016).

The theoretical framework the most responsible for the development of education towards an investment thinking might be the human capital theory by Becker (1962). The human capital theory assumes that education is crucial to enhance productivity of an economy. As a result, an educated population ought to be a productive population. Human capital theory further describes how education increases the productivity of labor force by investing in cognitive skills of human beings. Investments in education are considered to be more valuable in the long run than investing in physical capital (Olaniyan & Okemakinde, 2008, p. 479).

On average, in OECD countries, males invest around USD 52 500 (direct costs plus foregone earnings) to achieve a tertiary education, whereas females invest around USD 41 700. Men are expected to have higher total benefits over their careers than women (USD 319 600 for men, compared to USD 234 000 for women). Figure 14 shows that, on average, investment in tertiary education pays off for women and men in the long-term (OECD, 2018a, p. 102).

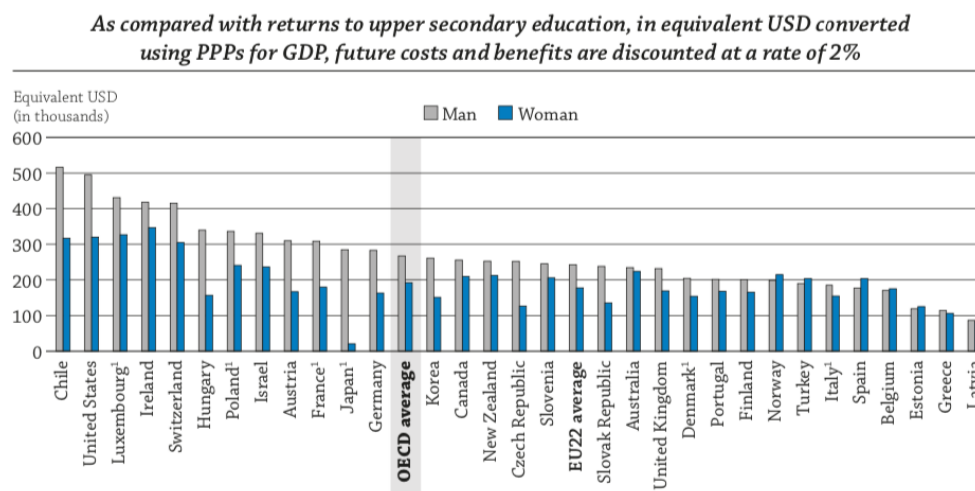


Figure 14: Private Net Financial Returns for Attaining Tertiary Education in 2015 (OECD, 2018a, p. 102)

The rising importance of education can also be observed by increasing spending on tertiary education in the last 16 years in almost all OECD member states. In 2015, on average, private entities spend around USD 4 600 per student in tertiary education levels, which represents approximately 40% of the expenditure per student by governments at the same level (USD 11 100) (OECD, 2018a, p. 247). A further explanation for increasing spending on education provide Kendzia and Zimmermann (2013) in their article about

decreasing fertility rates. With increasing population and wealth in developed countries, families have fewer children, but invest more in the educational training of the ones they have.

Increasing life expectancy plays a crucial role in the yields of time and money spent on education. People's willingness to invest in their education is dependent on the return on investments they expect from a potential future employment (Diprete & Buchmann, 2006). If life expectancy and therefore working life is only a few years, this investment may not pay off.

3.1.4 Emancipatory Factors

That women can no longer be neglected as an important part of a country's economy has been undeniable since World War II. Back then women had to replace men, and therefore started to work in occupations where men were lacked. In 1940, the labor participation rate of white women from 45 to 54 years old was 10.1%, and increased to 20.2% in 1950. Not only war propaganda encouraged women to work in wartime economies, but also the absence of husbands that led to less housework and to a significantly dropping family income. Investments made in the wartime by women in job training and in alternative housekeeping arrangements contributed significantly to the remaining of women in the labor market (Goldin, 1991, p. 471).

In addition, several other factors contributed to a remaining and moreover, to a rise in female labor participation, especially among married women with children.

First, technological and medical advancements allowed women to enter the labor market more easily. Time-saving consumer goods such as washing machines and vacuum cleaner resulted in more efficient ways to do housework and therefore more free time. In addition, the introduction of the infant formula, which enabled women to be apart from their children for a longer time, encouraged female labor participation. It is estimated that such a decrease in maternal burden accounts for approximately 50% of the increase in married women's labor force participation between 1930 and 1960 in the USA (Ortiz-Ospina & Tzvetkova, 2017).

Second, later marriages and smaller families have significantly increased female labor participation rates in almost all developed countries. (Bond, Galinsky, & Swanberg, 1997). As Kendzia and Zimmermann (2013) conclude, the benefit of having children

declined with lower child mortality rates and the development of the social security system. Their findings are in line with the so-called child quantity-quality (Q-Q) trade-off between fertility and education by Becker (1981). With increasing per capita income, parents have fewer children, but provide them with higher standards of living.

The trend of an increasing female workforce is outlined in Figure 15, which shows changes in female labor participation rates in relation to the overall amount of women in the represented categories.

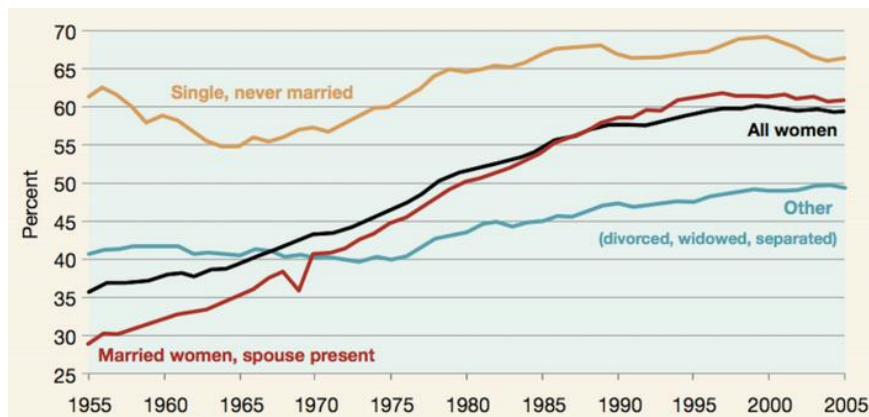


Figure 15: Labor Force Participation of Women in the USA (U.S. Census Bureau, 2010; U.S. Department of Labor, 2010)

Also, men's relationship to work and family has changed drastically. The times when men alone were responsible for family income are over, just as young men's wages have been stagnating or falling for 30 years (Oppenheimer, 1988; White & Rogers, 2000). While employed men are spending more time in housekeeping and childcare now than they did 30 years ago, employed women are spending less. Despite women's great progress in terms of education and employment, a gender pay gap still exists (Bachelet, 2016). However, the gap has narrowed since 1960, when women only earned 60% of men's income (Blau & Kahn, 2007).

3.2 Behavioral-Psychological Gender Differences

In this section, behavioral-psychological differences between women and men that are suggested be responsible for the gender gap in education were listed. The term "behavioral-psychological" refers to differences in personality, cognitive abilities, and biological aspects that can be inherited or learned.

3.2.1 *Cognitive Factors*

Neuroscientists generally believe that any observed gender difference in cognitive ability and behavior was due to cultural influence. “The neuroscience literature shows that the human brain is a sex-typed organ with distinct anatomical differences in neural structures and accompanying physiological differences in function”, determines Cahill (2017), and claims that there are inherited cognitive gender-associated differences of human beings. Taking into account that men’s brain size is bigger, women’s hippocampus, which is the part in the brain responsible for learning and memorization, is larger, and works differently than men’s (Goldman, 2017).

At an experiment conducted in 2000, brains of women and men who watched either aggressive or emotionally neutral movies were scanned. In women’s case, activity in the left amygdala was observed, while in men’s case, there was only activity in the right amygdala. Amygdala is a paired core area of the brain that is responsible for recognizing fear and preparing for emergency events. Scientists concluded this observation with the assumption that women have a stronger memory of emotional events than men. In addition, women recall emotional memories more intensely, and therefore are more prone to depression and anxiety (Goldman, 2017).

But not only are women believed to be more emotional than men, they also tend to mature earlier. Lim, Han, Uhlhaas & Kaiser (2015) proved that girls optimize brain connections at an earlier age than boys do. The researchers conclude that this may explain why women generally mature faster than men in certain cognitive and emotional aspects.

Studies with 121 healthy participants between the ages of 4 and 40 were conducted, and showed significant gender differences. The brain undergoes a major reorganization as it matures, reducing the total number of connections but focusing on the long-distance connections that are critical to integration information. As a result, such selective processes explain why brain function does improve during the restructuring of the brain network. The researcher’s experiment provided evidence that females undergo this process up to 10 years earlier, and therefore mature faster than males (Lim et al., 2015).

3.2.2 *Motivation*

Martin (2004) investigated potential gender difference in the motivation to learn, and found that there is slight variation between women and men in general, but significant

gender variation in terms of the study subject. The three motivation variables measured were “self-efficacy”, “task value”, and “learning focus”.

Martin (2004) defined the variables as the following:

“Self-efficacy: Students’ belief and confidence in their ability to understand or to do well in their schoolwork, to meet challenges they face, and to perform to the best of their ability.

Task value: How much students believe that what they learn at school is useful, important, and relevant to them or to the world in general.

Learning focus: Being focused on learning, solving problems, and developing skills.”

Out of the three, only the variable “learning focus” revealed a significant difference at all (effect size 0.14), with girls having the advantage (Martin, 2004).

Martin (2004) came to the conclusion that gender differences in motivation are differences of degree, not of kind. Wolters and Pintrich (1998) measured motivation differences for gender with the variables “self-efficacy” and “task value”, applied on the subjects mathematics, English, and social studies. A sample of students ($n = 2\,927$) from 12 different high schools around the area of Sydney and Canberra in Australia were used. While females and males valued school similarly in general, there were significant gender differences in specific fields of study.

According to Table 3, measured with the overall mean, males revealed greater task value in mathematics ($M=5.51$) than in either social studies ($M=5.35$) or English ($M=5.32$), whereas reporting no significant difference in valuing English and social studies. Females revealed similar results, while they valued mathematics ($M=5.51$) over English ($M=5.37$) and social studies ($M=5.11$), but differed by valuing English over social studies (Wolters and Pintrich, 1998).

Analysis of the variable “self-efficacy” showed the same effects; a main effect by study subject and gender, but no effect for just gender. Men reported no significant difference in the variable “self-efficacy” between subjects, while the analysis showed that women reported more self-efficacy in English ($M=5.71$) than in either mathematics ($M=5.36$) or social studies ($M=5.33$) (Wolters and Pintrich, 1998).

Content Area	Males (M =)	Females (M =)
Task Value		
Social Studies	5.35	5.11
English	5.32	5.37
Mathematics	5.51	5.51
Self-Efficacy		
Social Studies	5.54	5.33
English	5.64	5.71
Mathematics	5.59	5.36
M = Mean		

Table 3: Domain Specific Task Value, Self-Efficacy and Gender (Wolters & Pintrich 1998)

3.2.3 PISA Results

The Program for International Students Assessment (PISA) launched by the OECD assesses the extent to which 15-year-old students, towards the end of their compulsory education, have gained key knowledge and skills that are considered as essential in modern societies. The assessment focuses on the core school subjects which are science, reading, and mathematics. In the past decade, PISA has established as the world's premier program for evaluating the quality, equity and efficiency of school systems (OECD, 2018b, p. 1-2).

Results from 2015 (latest available) of science, mathematics, and reading performance are listed, and visualized in the following figures with a cross-country comparison.

Figure 16 shows science performance, which measures “the scientific literacy of a 15-year-old in the use of scientific knowledge to identify questions, acquire new knowledge, explain scientific phenomena, and draw evidence-based conclusions about science-related issues” (OECD, 2019b). On average (highlighted red), boys outperform girls in science with a slightly better score.

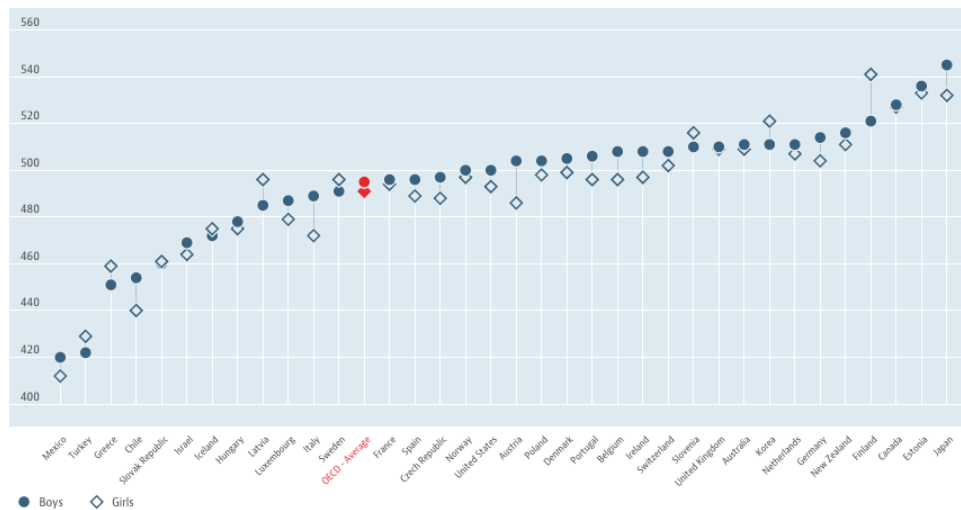


Figure 16: Science Performance PISA from 2015 (OECD, 2019b)

Figure 17 shows mathematic performance, which measures “the mathematical literacy of a 15-year-old to formulate, employ and interpret mathematics in a variety of contexts to describe, predict and explain phenomena, recognising the role that mathematics plays in the world” (OECD, 2019c). On average (highlighted red), boys outperform girls in mathematics. However, this male advantage has been declining over the last 50 years (DiPrete & Buchmann, 2013, p. 100).

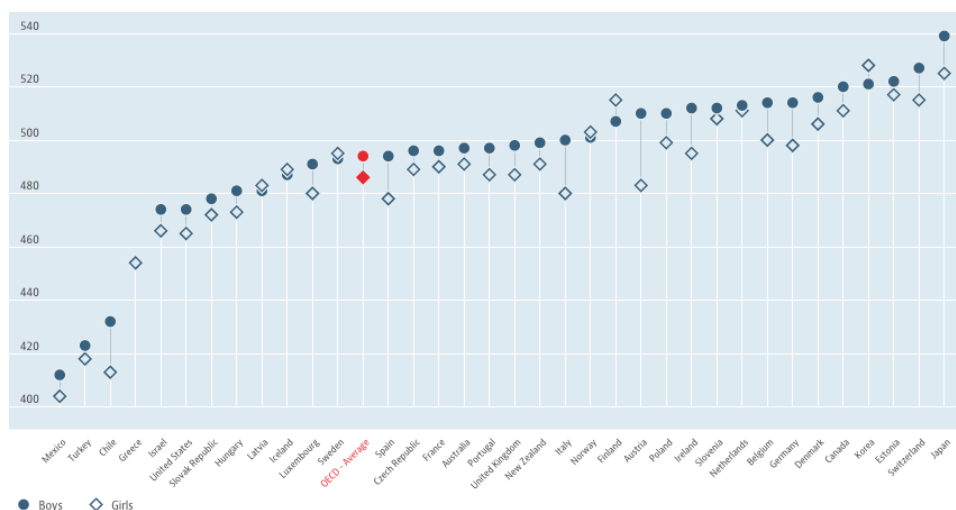


Figure 17: Mathematics Performance PISA from 2015 (OECD, 2019c)

Figure 18 shows reading performance, which measures “the capacity to understand, use and reflect on written texts in order to achieve goals, develop knowledge and potential, and participate in society” (OECD, 2019d). On average (highlighted red), girls outperform boys in reading. This female advantage has been stable over the last 50 years (DiPrete & Buchmann, 2013, p. 100)

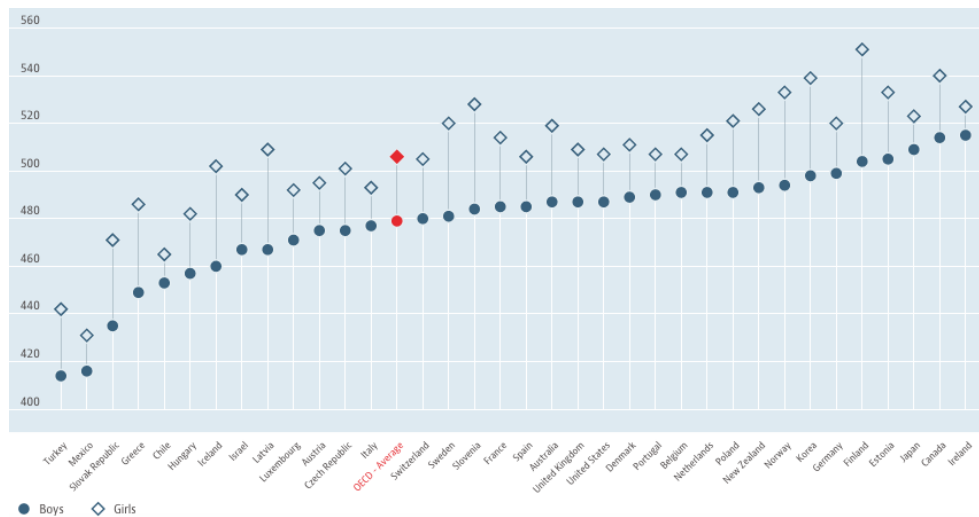


Figure 18: Reading Performance PISA from 2015 (OECD, 2019d)

OECD (2018b, p. 8) believes that the results do not specifically show the skills of each gender, but the motivation. So did 25% of boys report to expect a career in science related fields, whereas only 23% of girls reported the same expectation.

Not only student’s career expectations differ significantly by gender, parents still hold different expectations for their sons and daughters. Figure 19 shows that in all the above listed countries, parents were more likely to expect their sons, rather than their daughters, to work in STEM occupations (OECD, 2015a, p. 194).

For example, in Hungary the gender gap amounts more than 30%. The gender differences in academic performance measured in PISA do not explain the differences in parents’ expectations for their children to work in STEM occupations. The gender gap maintains significant in all countries listed below, even when taking into consideration students’ performance in reading, mathematics, and science (OECD, 2015a, p. 194).

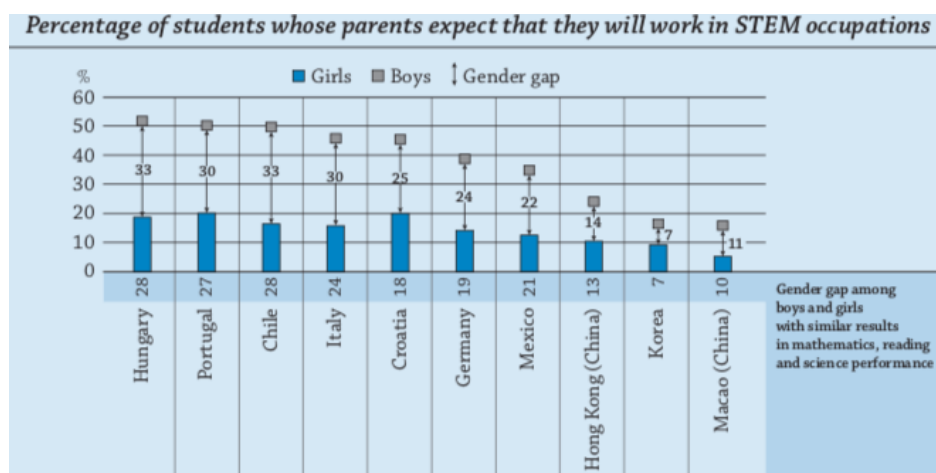


Figure 19: Parents’ Expectation for Their Children’s Careers (OECD, 2015b)

4 Findings

The previously outlined literature provided the necessary understanding of the increasing gender gap in education. This chapter presents findings of the collected information and data from the literature review, theoretical framework, and semi-structured interviews.

4.1 External vs. Internal Forces

Socio-economic trends or any external change that occurred in the last decades are suggested to be driving forces behind the onset of the educational advantage of women. On average, the gender gap reversed to a female advantage in the 1980s (when students with birth year 1960 were around 20 years old). External factors in general that affect students during their life course such as educational and familiar environments were found to be crucial for the existence of the phenomenon and especially for cross-country differentiation. Furthermore, the external environment rather than cognitive skills was found to be responsible for gender differences in field of study.

Internal factors such as behavioral-psychological differences between women and men do not explain the occurrence of the phenomenon or variation between OECD countries. Internal factors are not likely to change drastically over time, and do not differ significantly in similar Western countries. Against all odds, gender differences in performance were not found to be responsible for great gender variation in certain fields of study.

4.2 Driving Forces behind the Phenomenon

Driving forces behind the phenomenon consist of external and internal factors. First, external forces are listed which are responsible for the existence and reversal of the gender gap in education, and contribute to transnational differentiation. Second, internal forces that further provide an explanation for any variance of educational attainment among gender are listed.

4.2.1 External Forces

Although globalization is a significant trend that occurred around the same time as the reversal of the gender gap in education, there is no indication towards a gender specific influence. Moreover, globalization affected both, women and men, in terms of educational attainment in recent decades. As mentioned in Section 3.1.1, standardization of the educational system enabled international studies in a lot of more developed and

less developed countries. This movement of students around the world enhanced diversity and acceptance of different notions, but also competitiveness. There is evidence that growth rates are higher in countries (especially developing countries) that are open to the effects of globalization than in countries with closed economies.

Female educational attainment rates increase by the economic status of the country, with the highest rates of female participation in tertiary education in high-income countries. Women are not the majority in low or lower-middle income countries, where they represent only 38.22% and 48.66%, respectively, of the tertiary education population. With rising growth rates came rising investment in education, and somehow women profited more than men from increasing spending on education.

A growing need for a highly educated workforce in national economies regardless of gender contributed significantly to a rising importance of tertiary education and its increasing investments. Women exploit the return on investment approach to a greater extent than men. However, men's total benefits of higher education are still expected to be higher due to family-related reasons and a still existing gender wage gap. But, women's benefits from completing a higher education have risen too. Well educated women have a higher standard of living and greater insurance against poverty because of better work opportunities.

Expanded participation in higher education does not translate in other settings into subsequent employment in the labor market. However, with women's rising educational attainment rates came higher female labor participation rates. This increase in female workforce can mostly be attributed to World War II, when women had to work because of the absence of men. Female labor participation rates, especially among married women with children, increased drastically during the war, and stayed high even in the post-war time. Women's role in Western society has changed drastically since then. Some modern families show the characteristics of a working father and a working mother, only a few children, and late marriage.

There is evidence for a positive correlation between female labor participation and female educational attainment. Therefore, countries with high female labor participation rates show higher female educational attainment rates than countries with low female labor participation rates. It is suggested that well educated and working women (especially in professions that require a form of higher education) act as a role model function and

modernization factor for girls. For example, girls with a highly educated mother show greater college completion rates than girls with a mother without college degree. This implies that also the parent's cultural capital contributes to success at school. Cultural environment in general was found to be a crucial factor for educational attainment. As a result, a highly religious environment implies a negative impact on educational attainment for both gender, but affects girls more negatively.

Not only the cultural environment, but also the way the education system is shaped affects students' educational success. Schools with a highly academic climate, rather than a peer culture show smaller gender gaps in education. Especially boys' performance is hindered by a non-academic culture with the focus on leisure activities. Furthermore, there is a positive correlation between the percentage of male elementary school teachers and the percentage of young men who attained higher education. However, it cannot be argued that female teachers are gender biased, and therefore mark girls more favorably. Teachers are aware of gender differences, and take these into consideration when evaluating their students. Female teachers act as a role model, which enhances the motivation of girls, and hinders motivation of boys.

4.2.2 *Internal Forces*

The human brain is a gender-typed organ with differences in neural structures and accompanying physiological differences in function. Due to the cognitive distinction among women and men the existence of a gender gap in education might become more explainable. Women's brain literature shows higher learning and memorization ability, which allows them to recall emotional memories more intensely. As a result, women are more prone to depression because they don't forget traumatizing memories as easily as men do. But women's emotional tendency also contributes to higher social and behavioral skills. Thus, periodic measurements from kindergarten to elementary school showed higher social and behavioral skills for girls.

Lim, Han, Uhlhaas and Kaiser (2015) proved that women mature up to 10 years earlier than men. According to Greenhornet's (2007) definition of maturity as "the ability to do what one knows is beneficial despite one's emotions; and conversely, the ability to not do what should not be done, even under compelling emotions", it would give girls the opportunity to develop an awareness of the value of school earlier than boys.

Results from the return on investment approach support this thesis, and explain women's above average yields of money and time spent on education. Time spent on education is a crucial indicator of performance, which is measured higher for girls according to their grades in high school. However, this may not be a very accurate measurement as different courses with different levels are chosen by the students.

The motivation to learn did not differ significantly between girls and boys, but according to gender in relation to the field of study. Girls reported higher motivation for literature subjects, while boys favored mathematical subjects. These motivation differences for gender and fields of study are central for any performance difference measured continuously by PISA. Motivation as an internal factor does therefore against all odds, not contribute to the increasing female educational advantage reported by average among all fields of study.

4.3 Variation between OECD Countries

As represented in Figure 20, the gender gap in educational attainment varies significantly across different OECD countries. While in Latvia, around 23% of young men and around 47% of young women (gender gap of 24%) are likely to graduate with a tertiary degree, Luxemburg shows almost no gender gap.

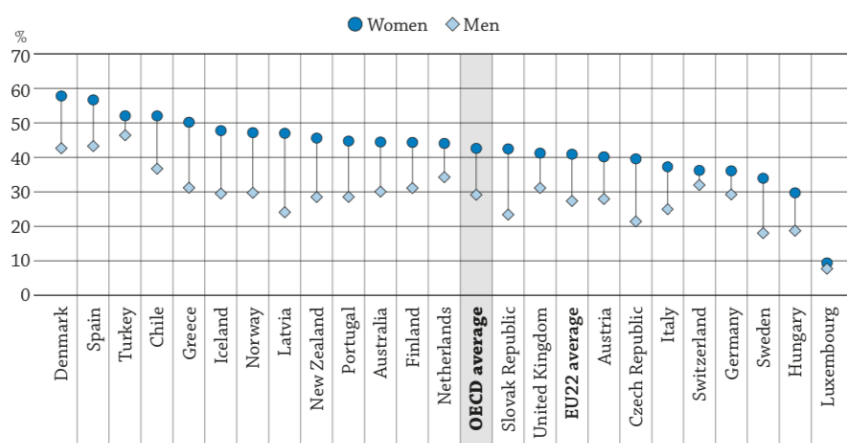


Figure 20: First-Time Tertiary Graduation Rates for Students Younger than 30 (UIS, 2018; Eurostat, 2018)

Whereas Figure 20 shows cross-country variation measured in 2015, Appendix 8 provides cross-country comparison over time of educational attainment for gender. It is crucial to base findings on the overall trend and not only on one momentum.

Some of the recent socio-economic trends were found to be of greater influence on variation between OECD member states than others. For example, Switzerland shows

almost no gender gap in tertiary education, meaning girls and boys equally graduate. Female right's achievement in Switzerland came relatively late compared to other European countries, which is attributed to its neutrality during World War II. While females in other European countries, as mentioned in Section 3.1.4, revolutionized the labor market because of the absence of men at war, Swiss females did not profit from this opportunity. As a result, a lot of emancipatory factors occurred later in time and females have gained less educational advantage.

Parents' cultural and human capital also contributes to the varying gender gap between countries. OECD member states include mostly high-income Western countries, but also emerging countries such as Mexico, Chile and Turkey. Emerging countries with lower income levels and a greater degree of religiosity show generally lower tertiary graduation rates with a smaller female advantage.

4.4 Variation between Field of Study

The gender gap in educational attainment indicates an overall advantage for women, but this female advantage does not translate into every field of study. Figure 21 shows the share of female bachelor's graduate by field of study measured in 2013. Women are still largely underrepresented in science and engineering studies, whereas they hold the lead in education, humanities and social science studies.

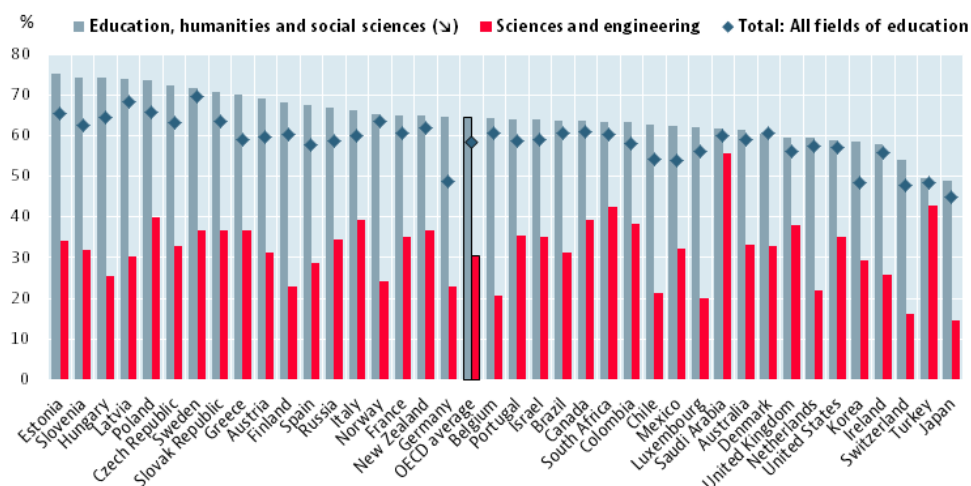


Figure 21: Share of Female Bachelor's Graduate by Field of Study (OECD, 2015a)

Although there is a positive correlation between standardized test results and the proportion of each gender represented in a certain field of study, it cannot be argued that gender differences between the field of study are directly performance related. Moreover, motivation accounts for a bulk of gender variation between the field of study. As outlined

in Section 3.2.2, girls show higher motivation for subjects they also hold the lead at university, and the same is true for boys. Motivation is a driving force for greater performance, and is therefore an explanation for the standardized test results in Section 3.2.3.

Society's career expectations for girls and boys are still very gendered. The terms "boy's profession" and "girl's profession" are widely spread, which affects the motivation of young students. As shown in Figure 19, Parents expectations of their sons working in STEM occupations are significantly higher than their expectations for their daughters having the same career. These expectations are not performance related, as proven as well in Figure 19. Even parents' expectations for daughters and sons with similar standardized test results in reading, mathematics, and science do not differ from children with totally different test results.

5 Discussion

In this chapter, key findings were put into an explanatory model, outlined in Figure 22 in order to discuss interdependence, and answer the initial defined research questions. The explanatory model developed by Quenzel and Hurrelmann (2013) was extended with the findings of this current thesis, and therefore used as a base for derivation.

5.1 Explanatory Model

Globalization was proven to be a driving force of *economic growth*. Countries open to globalization's implications reported higher growth rates than countries with inward-oriented economies. Educational attainment rates, especially the one of girls, increase by the economic status of the country, and among others, this is due to *higher investments in education*.

With his human capital theory, Becker (1962) shaped the common thinking of education towards an investment in one's individual future. Since then investment in human capital has been recognized as an indicator of economic productivity. As a result of the continuously *rising demand of educated workforce* around the world, yields of money and time spent on education have risen significantly.

The exploitation of *the return on investment approach* requires a certain level of *maturity*, which differs by gender. Girls mature up to 10 years faster than boys, and therefore are earlier provided with an awareness of the value of education. This advantage in development gives young women the opportunity to make greater use of the return on investment approach. Since girls have started to outperform their peers in educational performance, *female labor participation* in highly educated occupations has risen significantly.

World War II was one of the initial factors that encouraged a lot of married women with children to enter the labor market. Female labor participation was found to positively affect female educational attainment by referring to the *role model approach*. Boys' educational attainment rates on the other hand, decrease by an increasing female labor participation. In addition, the significantly high number of *female teachers* does negatively correlate with boys' graduation rates. The feminine educational environment does not only hinder boys, but it also enhances girl's educational attainment.

The degree of *religiosity* in a students' environment affects the educational attainment of both gender negatively. However, the effect is more negative on girls. To conclude, a modern cultural environment contributes to female educational performance.

Whereas the interaction of external and internal factors is responsible for the gender gap in educational attainment, only external factors are driving forces behind the onset of the phenomenon and any cross-country variation. Even though, OECD member states are mostly Western, developed countries with similar environmental conditions, these conditions differ in extent. Behavioral-psychological differences between women and men do not vary across OECD countries, and therefore do not contribute to any cross-country variation.

Against all odds, high gender variation in the field of study is not performance related. Moreover, *motivation* is a driving force behind students' study choice. It was found that there are significant motivation differences by gender in terms of school subjects. Explanation provides the analyses of parents' expectation, which differs by the gender of their children. As a result, *parents* and *society* enhance a gendered lifestyle and influence their children's career choices.

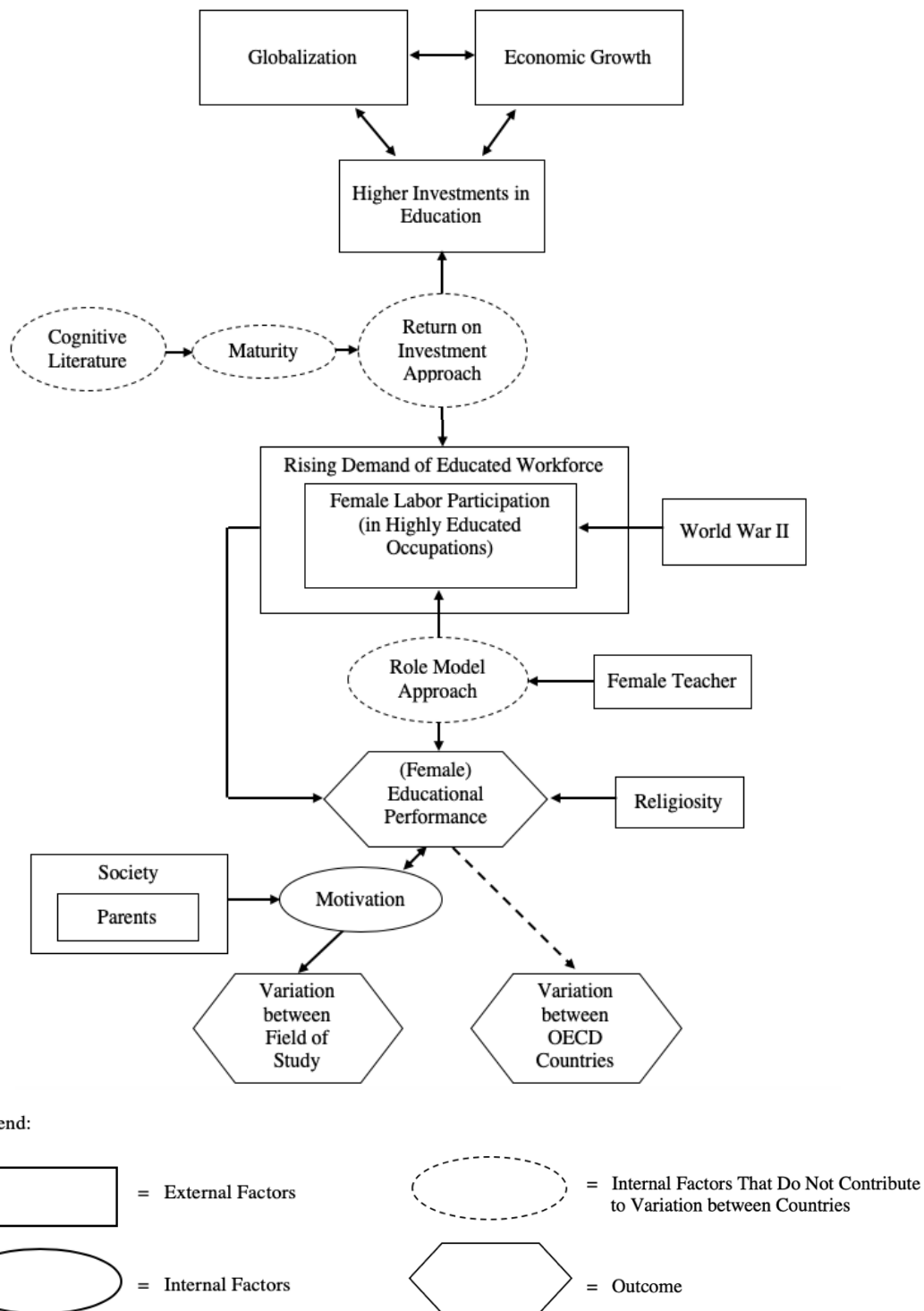


Figure 22: Explanatory Model Based on (Quenzel & Hurrelmann, 2013, p. 79)

5.2 Constraints

Educational performance and its variation between countries and fields of study is a complex thematic with a lot of interdependent forces behind it. Although the above explanatory model is more comprehensive than the one developed by van Hek et al. (2016), there are by far not all factors relevant to the phenomenon included. For example, as DiPrete and Buchmann (2013) concluded, the level of academic climate and the

adolescent culture could also provide an explanation for a gender gap and for variation between countries. However, since globalization has boosted standardization of the education system in almost all OECD countries, this would not explain cross-country differences. The above stated model focusses on the key finding from this bachelor thesis, which are believed to be the most important factors behind the phenomenon.

Furthermore, the model does not clearly outline the driving forces behind the onset of the gender gap in education in favor of young women. This is mainly attributed to social-economic changes in the last decades especially to emancipatory factors that developed in favor for women. Internal factors such as level of maturity and cognitive literature do significantly contribute to any female advantage in education, but do not explain the reversal of the gender gap. In addition, female teachers used to dominate the education system even before the gender gap reversed to a female advantage. The role model approach would therefore, again, explain a gender gap with a female advantage but not the occurrence of it.

Female hold the lead in educational attainment throughout all educational levels, starting in elementary school. The return on investment approach requires, as represented in the model, a certain level of maturity, which is not given in early years. As a result, the return on investment thinking is not effective in elementary school, and does therefore not explain the phenomenon in early educational levels.

6 Conclusion

Several different approaches and factors were investigated in this current bachelor thesis in order to answer the research questions in Chapter 1. Existing literature on the phenomenon explains the increasing gender gap in favor of girls only partly.

Quenzel and Hurrelmann (2013) provided insight on the reasons behind the existence of the female advantage in education, but without any explanation about the occurrence of the phenomenon around 1980, on average, in OECD countries. Their developed model focusses on internal factors, whereas external factors are left out. Furthermore, there was no cross-country comparison or differentiation between the field of study done.

Van Hek et al. (2016) continued doing research where Quenzel and Hurrelmann (2013) stopped. In their paper, the gender gap in 33 Western countries and among 33 birth cohorts was compared. Reasons for the reversal of the gender gap and for any cross-country difference were found in external factors such as religiosity and female labor participation. Although findings provide great insight into the occurrence and differentiation of the phenomenon, there are by far not all relevant aspects included.

DiPrete and Buchmann (2013) outlined numerous comprehensive approaches in their book in order to explain the existence of any gender gap in education, the reversal of it, variation between the field of study, and variation between ethnic groups. Even though thorough research on internal and external factors was done, the authors focused the investigation on the United States, which does not translate in other settings into all OECD countries.

Socio-economic changes that took place in the last decades were found to significantly enhance educational the performance of girls and boys. However, girls made greater use of these changes. In addition, several female rights achievements and the changing status of women's roles in society acted in favor of young women in terms of educational attainment. In OECD countries, socio-economic trends are present to a different extent, and therefore explain cross-country variation of the female advantage in education.

Behavioral-psychological gender differences are responsible for the fact that girls made greater use of socio-economic opportunities in the last decades. Crucial for that advantage is girls' ability to mature up to 10 years quicker than boys, as Lim et al. (2015) proved.

Therefore, young women develop an awareness for the value of education relatively early, and exploit the return on investment approach to a greater extent than boys.

Society and especially parent's influence, rather than performance was found to be responsible for large variation between the field of study. Parent's expectations differ strongly for their daughters and sons regardless of their performance in school subjects, which leads to different motivation for girls and boys. These motivation differences account for a bulk of gender variation between the field of study.

6.1 Recommendation

On the one hand, the vast amount of educated women brings new opportunities for the labor market. Nowadays, women account for 40% of the global labor force and therefore significantly contribute to economic growth (Bachelet, 2016). In order for economies and firms to profit from the overtaking educated female workforce, they have to adjust to increase attractiveness of female employment. It is a waste of resources if a large amount of the more educated gender is not making use of labor market opportunities.

A lot of women are challenged by aligning family and profession, so that more policies should be developed to ease that burden. Much improvement has already been done in order to make employment more attractive to women. For example, there are a lot of part-time occupations, job-sharing models, and external childcare opportunities. However, the above mentioned examples still lack in practical terms. Part-time and job-sharing solutions are not favored in executive positions, which would be suitable for a highly educated workforce. In addition, external child care in most European countries is associated with high costs, which makes it not reasonable for mothers to seek employment.

Part-time and job-sharing occupations should be ensured even in higher positions, so that economies could profit from forgone economic growth by a female educated workforce. Since firms do not recognize any incentive in doing so, governmental policies should be developed to ensure not a female quota, but a quota for part-time and job-sharing models in higher positions. Not only working mothers would profit, also fathers would increase benefits by having more time to spend with their family.

On the other hand, there are also costs of a male shortfall in education. DiPrete and Buchmann (2013, p. 5) argued that personal income rises by the level of education

attained. In the United States, the median income for men with less than a high school degree was USD 22 000, for men with a bachelor's degree it was USD 40 000, and for men with a graduate diploma it was USD 82 000. These large differences implicate that American men and society miss a great amount of income due to the male shortfall in education.

According to UNESCO (2018), education is one of the most powerful catalysts for equality. Educated men are more likely to embrace gender equality, to participate in child care, and are less likely to practice physical and sexual violence.

Therefore, boys cannot be neglected, and their educational disadvantage has to be addressed in order to enhance boys' educational attainment rates. In past decades, a lot of policies were undertaken to support girls at school since they were the disadvantaged gender in many aspects. Girls do not seem to further need that support in education. In contrast, it appears that the boy's motivation and learning process should be supported now.

6.2 Outlook

As mentioned in Chapter 1, there is little empirical research available about the reasons behind the growing gender gap in education. Female tend to significantly outnumber their peers in terms of educational attainment in almost all developed countries. This tendency is increasing and the phenomenon is suggested to have a great influence on a country's economy.

Further research could be done about the same research questions as defined in this bachelor thesis. After investigating the driving forces behind the onset, the existence, variation between OECD countries, and variation between the field of study of the gender gap in education, there are still factors unmentioned. In addition, the impact of the phenomenon on the future labor market or on a country's economy in general was not comprehensively addressed. The increasing female gender gap in education will, even if not in other settings, translate into the labor market and beyond. Women as the more educated gender cannot longer be underestimated in the global economy.

Although female labor participation is still lower than men's due to family-related reasons, this might change in the foreseeable future. As mentioned in Section 6.1, family-

related barriers could be addressed as a result of high female graduation rates, and such adjustments would allow women to enter the labor market or political parties more easily.

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IV. Appendices

1. Appendix: Questionnaire

Dear Interviewee,

I am a student at the University of Zurich for applied Science (ZHAW). Under the supervision of my bachelor thesis advisor, I am conducting this interview that investigates the driving forces behind the widening gender gap in education with an advantage of girls.

I am inviting you to respond to this interview questions in which you will be asked what according to your opinion as an expert might be the main reasons and implications for this phenomenon. It should not take more than 5 minutes to response the interview questions.

Your participation in this interview is completely voluntary. There are no foreseeable risks, discomforts, or inconveniences expected to occur as a result of participating in the interview. You have the right to not answer any of the questions, skip questions, and you can stop the interview at any time.

The results of this interview may be presented to my class, to future classes, or published in an academic.

If you have questions or need more information about the study itself, please contact my Advisor Professor Dr. Michael J. Kendzia at +41 (0) 58 934 46 22 or by email michaeljan.kendzia@zhaw.ch.

Sincerely,

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Katja Dorninger

1. According to your opinion, what do you think are the main reasons why girls graduate more often from a tertiary education in OECD countries?

2. In the United States the phenomenon has occurred in all birth cohorts since 1960. What do you think has changed in our socio-economic environment that girls outperform their brothers now?

3. What do you think are the implications of this phenomenon on the labor market in those countries?

4. How do you explain a female advantage in education but a female disadvantage when it comes to the wage gap?

2. Appendix: Interview Gottlieb Duttweiler Institut

Gottlieb Duttweiler Institut (*conducted via phone and summarized*): Ms Karin Frick Lic. oec., Head Think Tank, Member of the Executive Board.

1. According to your opinion, what do you think are the main reasons why girls graduate more often from a tertiary education in OECD countries?

Today's education system in Switzerland seems to favor women over men. In recent years, the education system has focused on the fact how to encourage and foster women's educational attainment. This is normal because they used to be disadvantaged in terms of education in the old days. Maybe, the education system has come to a point where women are supported enough, and as a result, it now favors them. In addition, the large number of female teachers may act in favor for girls rather than for boys.

2. In the United States the phenomenon has occurred in all birth cohorts since 1960. What do you think has changed in our socio-economic environment that girls outperform their brothers now?

Girls were always more keen on studying, but they were not supposed to go to university and make a career. Society had other plans for women at that time. This has all changed drastically since the question of equality has arisen. The United States adjusted earlier to the phenomenon than Switzerland. In Switzerland, women weren't allowed to vote until 1971, whereas in other countries voting has been allowed for women for a long time. That indicates the assumption that legally women were not allowed to study unless their father or husband agreed. Later primary school got mandatory and that has also changed a lot.

3. What do you think are the implications of this phenomenon on the labor market in those countries?

Women are more than welcome in the labor market. Firms are already doing enough to make jobs attractive for women. For example, there are a lot of part-time and job-sharing models. Women, themselves, are the problem and not external factors that might favor men more. Nowadays, women have the same chances as men, but are somehow not taking them to the same extent.

4. How do you explain a female advantage in education but a female disadvantage when it comes to the wage gap?

I personally don't believe that women in Switzerland earn less than men. This is not legal in our country, but if they do, we have to make sure we compare the same things. For example, a lot of women work part-time, which comes with less responsibility and therefore less salary. Of course, they are doing the same job as a man does who works full-time, but the responsibility is not the same. Nowadays, there are also a lot of women who employ other women, so if they do earn less, it is their own fault.

3. Appendix: Interview EERA

Zagreb Institute for Social Research (ZISR) Network of EERA (*answers received per e-mail*): Prof. Branislava Baranović, Ph.D, Senior Scientist.

1. According to your opinion, what do you think are the main reasons why girls graduate more often from a tertiary education in OECD countries?

The main reasons why girls graduate more often than boys from a tertiary education can be observed on societal, family and individual levels.

For instance on the societal level the reasons are:

- a higher level of women's rights achievement, although they have not been fully completed;
- the growing need of national economies for highly educated workforce regardless of gender;
- the growing number and activities of women's human rights associations.

The reasons on family level:

- The vast majority of parents want their children, regardless of gender, to have a good future. Acquiring higher education is an important prerequisite for this;
- Parents want and support daughters to study because they want them to be economically independent from their husbands, to stand on their own feet.

The individual reasons:

- Intrinsic motivation and interest in studying certain areas;
- Girls are aware that their future is dependent on their education;
- Girls are also aware that they can harder get employed than boys, and therefore they are forced to reach higher educational achievements and levels.

2. In the United States the phenomenon has occurred in all birth cohorts since 1960.

What do you think has changed in our socio-economic environment that girls outperform their brothers now?

- The growing need of national economies for highly educated workforce because of scientific and technological development;
- The strengthening of national economies for intense competition on the global market requires highly motivated and educated workforce regardless of gender;
- A higher level of awareness of gender equality at the societal level.
- A higher level of gender equality in education.

3. What do you think are the implications of this phenomenon on the labor market in those countries?

The possible implications on the labor market:

- Increasing employment rate of women;
- Despite the increase in the employment rate of women, the labor markets in OECD countries are still gendered. We can talk about women's and men's professions. (e.g. women are highly underrepresented in the ICT sector);
- Although highly educated, women can harder get hired than men (family-and children related reasons);
- As a result of the gendered labor market and gender stereotypes, there is still a gap in salaries between women and men.

4. How do you explain a female advantage in education but a female disadvantage when it comes to the wage gap?

- In today's society, education is an important prerequisite for the future life of every individual, regardless of gender.
- A higher level of educational equality has enabled more women to acquire a higher level of education.
- Since women are still underprivileged, they are more forced than men to use education and to be successful in education, as one of the means to secure their future and independence.
- On the other hand, labor markets in almost all countries are still gendered and discriminate against women.

4. Appendix: Interview UNESCO

UNESCO - Section of Education for Inclusion and Gender Equality (*answers received per e-mail*): Ms Justine Sass, Chief of Section.

1. According to your opinion, what do you think are the main reasons why girls graduate more often from a tertiary education in OECD countries?

The phenomenon of greater participation of women in tertiary education is not exclusive to OECD Member States. According to the UNESCO Institute for Statistics, women make up globally 51.34% of students enrolled in tertiary education. The rates increase by the economic status of the country, with the highest rates of female participation in tertiary education in high-income countries. Women are not the majority in low or lower-middle income countries, where they represent only 38.22% and 48.66%, respectively, of the tertiary education population.

2. In the United States the phenomenon has occurred in all birth cohorts since 1960. What do you think has changed in our socio-economic environment that girls outperform their brothers now?

There are increasingly efforts to understand boys' disengagement in different contexts. See, for example, the UNESCO policy paper, [Achieving gender equality in education: don't forget the boys](#). As you can see in this paper, the disengagement doesn't begin in higher education, but much younger in secondary education levels, as seen in Latin America and the Caribbean, Europe and North America, and Northern Africa and Western Asia. In many contexts, boys (and their parents) perceive a lack of relevance of education for their future, and college does not seem to offer additional financial advancement. For OECD countries, this phenomenon is well explored in [this report](#).

3. What do you think are the implications of this phenomenon on the labor market in those countries? And how do you explain a female advantage in education but a female disadvantage when it comes to the wage gap?

I am not familiar with the situation in OECD countries, but expanded participation in higher education does not translate in other settings to subsequent employment in the labor market. In many settings this is linked to gender segregation in subject selection (including lower rates of participation in STEM fields of study, as observed in [this UNESCO report](#) and in other [research](#) on STEM participation in more gender equal countries. Lower rates of IT competence also come into play, as seen [here](#), which are of

concern in increasingly technology-dependent labor markets. Higher education needs to better link to labor market needs, and ensure that students come out of higher education with the capabilities to meet labor market requirements to ensure greater labor force participation. Other efforts are needed to accelerate gender parity in the labor market, including closing gaps in labor force participation, remuneration and leadership, and addressing the changing nature of work. The World Economic Forum has done some very good work to address these issues [here](#).

5. Appendix: ISCED Level 5 to 8 (UNESCO, 2012, p. 48-59)

Appendix 5 provides further insights into the tertiary education levels covered in this current thesis.

ISCED LEVEL 5 SHORT-CYCLE TERTIARY EDUCATION

A. Principal characteristics

207. Programmes at ISCED level 5, or short-cycle tertiary education, are often designed to provide participants with professional knowledge, skills and competencies. Typically, they are practically-based, occupationally-specific and prepare students to enter the labour market. However, these programmes may also provide a pathway to other tertiary education programmes. Academic tertiary education programmes below the level of a Bachelor's programme or equivalent are also classified as ISCED level 5.
208. Entry into ISCED level 5 programmes requires the successful completion of ISCED level 3 or 4 with access to tertiary education. Programmes at ISCED level 5 have more complex content than programmes at ISCED levels 3 and 4, but they are shorter and usually less theoretically-oriented than ISCED level 6 programmes.
209. Although ISCED level 5 programmes are usually designed to prepare for employment, they may give credit for transfer into ISCED level 6 or 7 programmes. Upon completion of these ISCED level 5 programmes, individuals may in some education systems continue their education at ISCED level 6 (Bachelor's or equivalent level) or long first degree ISCED level 7 programmes (Master's or equivalent level).
210. Programmes classified at ISCED level 5 may be referred to in many ways, for example: (higher) technical education, community college education, technician or advanced/higher vocational training, associate degree, or *bac+2*. For international comparability purposes the term 'short-cycle tertiary education' is used to label ISCED level 5.

ISCED LEVEL 6 BACHELOR'S OR EQUIVALENT LEVEL

A. Principal characteristics

224. Programmes at ISCED level 6, or Bachelor's or equivalent level, are often designed to provide participants with intermediate academic and/or professional knowledge, skills and competencies, leading to a first degree or equivalent qualification. Programmes at this level are typically theoretically-based but may include practical components and are informed by state of the art research and/or best professional practice. They are traditionally offered by universities and equivalent tertiary educational institutions.
225. Instruction at this level often takes the form of lectures by staff who are typically required to have attained ISCED levels 7 or 8 or have achieved experience as a senior professional in the field of work. Programmes at this level do not necessarily involve the completion of a research project or thesis, but if they do, it is less advanced, less independent or is undertaken with more guidance than those at ISCED level 7 or 8.
226. Entry into these programmes normally requires the successful completion of an ISCED level 3 or 4 programme with access to tertiary education. Entry may depend on subject choice and/or grades achieved at ISCED levels 3 and/or 4. Additionally, it may be required to take and succeed in entry examinations. Entry or transfer into ISCED level 6 is also sometimes possible after the successful completion of ISCED level 5. Upon completion of ISCED level 6 programmes, individuals may continue their education at ISCED level 7 (Master's or equivalent level), although not all ISCED level 6 programmes provide access to ISCED level 7. ISCED level 6 programmes do not usually give direct access to programmes at ISCED level 8 (doctoral or equivalent level).
227. Programmes classified at ISCED level 6 may be referred to in many ways, for example: Bachelor's programme, *licence*, or first university cycle. However, it is important to note that programmes with a similar name to 'bachelor' should only be included in ISCED level 6 if they satisfy the criteria described in Paragraph 228. For international comparability purposes the term 'Bachelor's or equivalent level' is used to label ISCED level 6.

ISCED LEVEL 7 MASTER'S OR EQUIVALENT LEVEL

A. Principal characteristics

241. Programmes at ISCED level 7, or Master's or equivalent level, are often designed to provide participants with advanced academic and/or professional knowledge, skills and competencies, leading to a second degree or equivalent qualification. Programmes at this level may have a substantial research component but do not yet lead to the award of a doctoral qualification. Typically, programmes at this level are theoretically-based but may include practical components and are informed by state of the art research and/or best professional practice. They are traditionally offered by universities and other tertiary educational institutions.
242. Instruction at this level often takes the form of lectures by staff who are typically required to have attained ISCED levels 7 or 8. Programmes at this level may involve the completion of a research project or thesis that is more advanced than those expected at ISCED level 6 and less advanced than those expected at ISCED level 8.
243. Entry into ISCED level 7 programmes preparing for a second or further degree normally requires the successful completion of an ISCED level 6 or 7 programme. In the case of long programmes that prepare for a first degree equivalent to a Master's degree, entry requires the successful completion of an ISCED level 3 or 4 programme with access to tertiary education. Entry into such programmes may depend on subject choice and/or grades achieved at ISCED levels 3 and/or 4. Additionally, it may be required to take and succeed in entry examinations. ISCED level 7 programmes have a significantly more complex content than programmes at ISCED level 6 and are usually more specialised. Upon completion, individuals may continue their education at ISCED level 8 (doctoral-level education) although not all ISCED level 7 programmes give direct access to ISCED level 8.
244. Programmes classified at ISCED level 7 may be referred to in many ways, for example: master programmes or *magister*. However, it is important to note that programmes with a similar name to 'master' should only be included in ISCED level 7 if they satisfy the criteria described in Paragraph 245. For international comparability purposes the term 'Master's or equivalent level' is used to label ISCED level 7.

ISCED LEVEL 8 DOCTORAL OR EQUIVALENT LEVEL

A. Principal characteristics

- 259. Programmes at ISCED level 8, or doctoral or equivalent level, are designed primarily to lead to an advanced research qualification. Programmes at this ISCED level are devoted to advanced study and original research and are typically offered only by research-oriented tertiary educational institutions such as universities. Doctoral programmes exist in both academic and professional fields.
- 260. ISCED level 8 usually concludes with the submission and defence of a thesis, dissertation or equivalent written work of publishable quality, representing a significant contribution to knowledge in the respective field of study. Therefore, these programmes are typically based on research and not only on course work. In some education systems, ISCED level 8 programmes contain very limited course work, or none at all, and individuals working towards a doctoral degree engage in research mostly independently or in small groups with varying degrees of supervision. In some education systems, doctoral research is undertaken by individuals employed by the university as junior researchers or research assistants, in addition to their being enrolled as doctoral students.
- 261. Entry into ISCED level 8 programmes or junior research positions normally requires the successful completion of specific ISCED level 7 programmes. ISCED level 8 qualifications give access to professions with high academic skill requirements and research posts in government and industry, as well as research and teaching positions in educational institutions offering education at ISCED levels 6, 7 and 8.
- 262. Programmes classified at ISCED level 8 may be referred to in many ways, for example: PhD, DPhil, D.Lit, D.Sc, LL.D, Doctorate or similar terms. However, it is important to note that programmes with a similar name to 'doctor' should only be included in ISCED level 8 if they satisfy the criteria described in Paragraph 263. For international comparability purposes, the term 'doctoral or equivalent level' is used to label ISCED level 8.

6. Appendix: Expected Tertiary Graduation Rates From 2016

“Tertiary graduation rate represents the estimated percentage of people who will graduate in tertiary education over their lifetime and the breakdown by gender for three levels of tertiary education” (OECD, 2016).

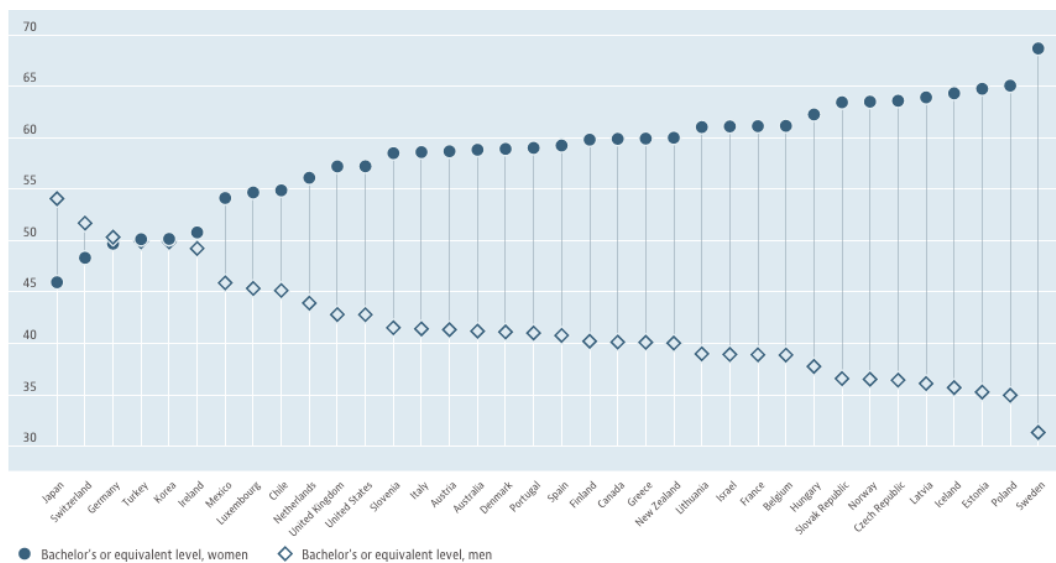


Figure 23: Expected Bachelor Graduates (OECD, 2016)

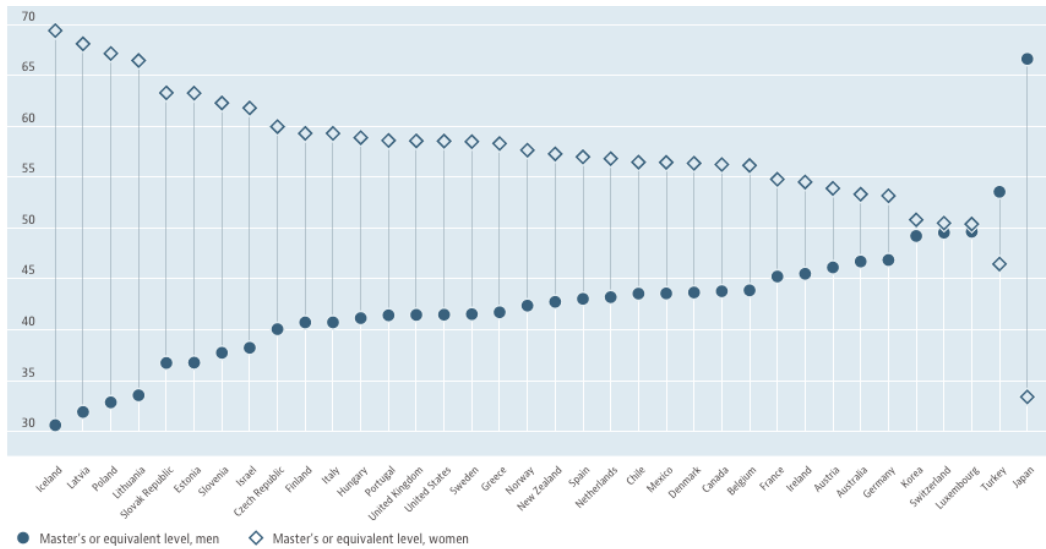


Figure 24: Expected Master Graduates (OECD, 2016)

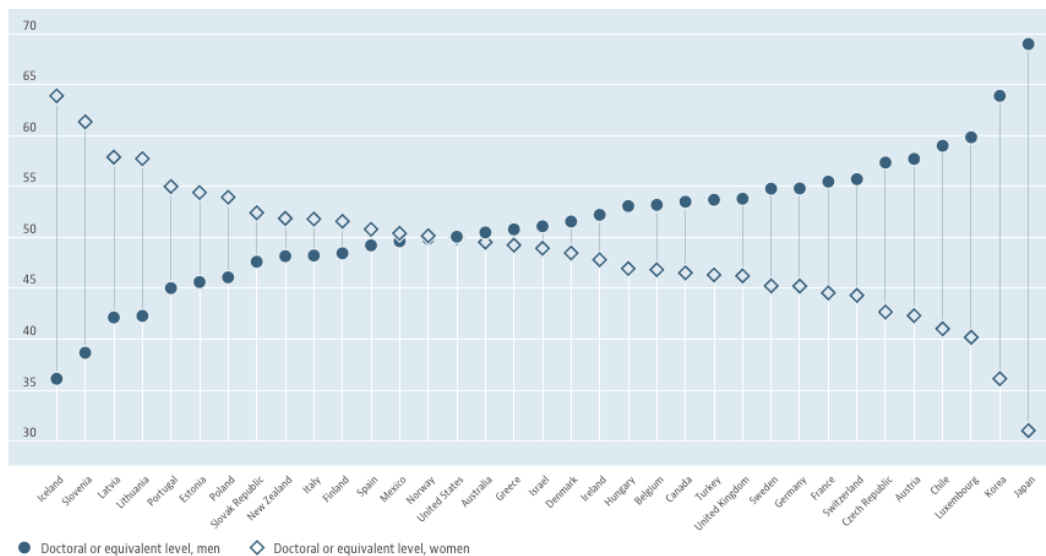


Figure 25: Expected Doctoral Graduates (OECD, 2016)

7. Appendix: Changing Incentives for Higher Education

Table 4 shows percentage of young people with a bachelor’s degree by gender and race in certain professions from 1940 to 2000 in the United States. The changes can be attributed to changing incentives for higher education and society aspects in the last decades.

	1940	1950	1960	1970	1980	1990	2000
Black Women							
Doctors, Dentists or Lawyers	0%	0%	0.8%	0.6%	2%	3.1%	3.3%
Engineers	0	0	0	0	0.9	1.5	2.1
Managers	0	0	0.6	0.8	5.6	9.2	10.3
Teachers	56.9	65.1	61.2	64.5	35.1	15.7	14.8
Nurses	3.5	0	3.7	3.3	3.6	6.5	5.1
Others	39.7	34.9	33.5	31.1	52.9	64	64.4
White Women							
Doctors, Dentists or Lawyers	0.9	2.2	1.5	1.1	2.4	4.1	3.8
Engineers	0.2	0	0.4	0.3	0.7	2	2
Managers	1.5	1.8	2.1	2.1	6.6	11.3	11.4
Teachers	53.3	33.9	45.4	50.7	33.9	17.5	19.5
Nurses	2.7	12.1	5.3	3.9	5.6	7.5	5.3
Others	41.4	50	45.2	41.9	50.8	57.6	58.1
Black Men							
Doctors, Dentists or Lawyers	5.1	5.7	5	2.2	4.3	4.3	3.5
Engineers	0	0	2.5	4.3	4.7	4.8	4.8
Managers	2.6	5.7	2.5	5.2	8.9	12.2	13.8
Teachers	35.9	28.6	31.5	29.2	12.4	7.6	10.3
Nurses	0	0	0.5	0.3	0.6	0.5	1.7
Others	56.4	60	58	58.8	69.1	70.6	65.8
White Men							
Doctors, Dentists or Lawyers	15.7	10.4	8.4	6.9	7.9	6.8	5.4
Engineers	7.5	11.1	12.5	11.3	6.8	9.1	1.7
Managers	9.4	11.6	11.3	10.5	15.4	17.7	17.6
Teachers	11.4	7.2	11.1	12.9	9.7	5.7	7.3
Nurses	0.2	0.1	0.1	0.3	0.7	0.7	0.9
Others	55.9	50.7	56.7	58.2	59.5	60	61.2

Table 4: Percentage of 28-32 Year-Olds with a Bachelor's Degree in Various Employments (McDaniel, DiPrete, Buchmann & Shwed 2011)

8. Appendix: Cross-Country Gender Differences in Educational Attainment

Van Hek, Kraaykamp and Wolbers (2016) investigated to what extent male-female differences in educational attainment have changed over birth cohorts from 1950 to 1982 in 33 Western countries. Figure 26 shows results from their investigation. Each dot stands for the gender difference between the average years spent in education in a particular country and cohort. A positive difference means a female advantage in education, whereas a negative difference indicates a male advantage.

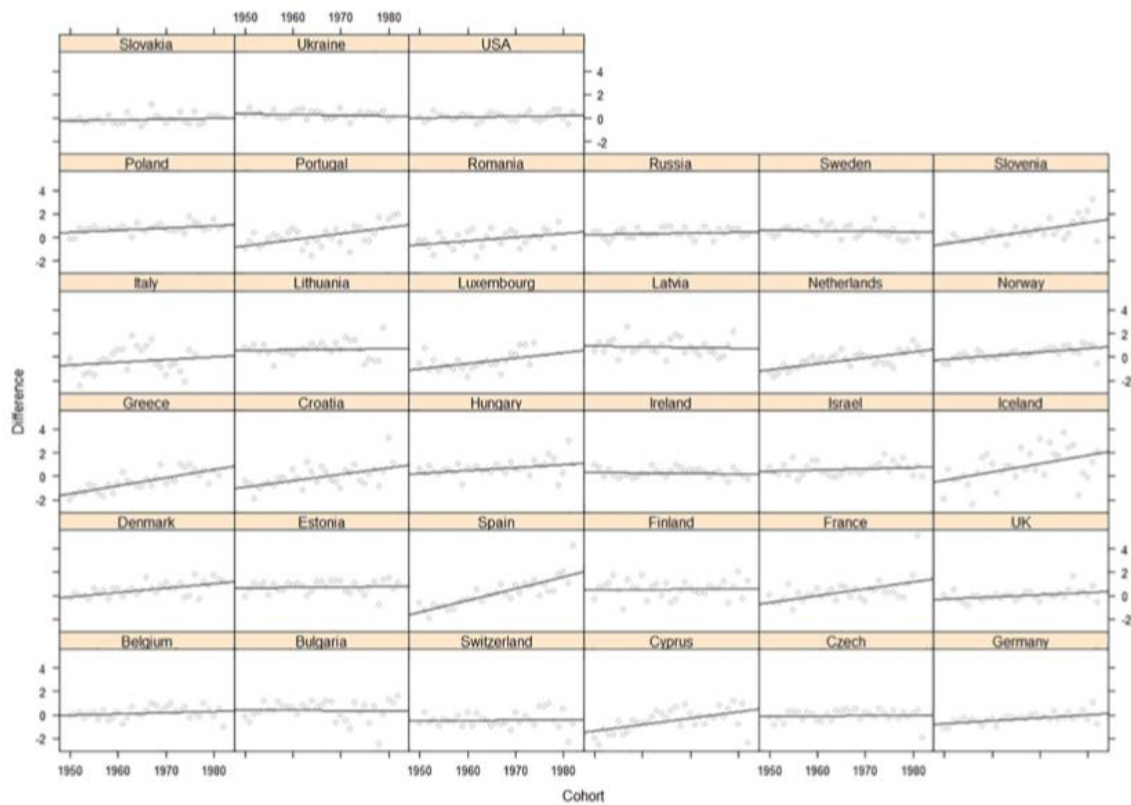


Figure 26: Gender Differences in Educational Attainment over Time (European Social Survey, 2002-2012; General Social Survey, 2002-2012)

9. Appendix: Results of Teacher’s Evaluation of Social Skills

Table 5 shows differences in social behavior reported by kindergarten teacher between 1998 and 1999 in z-values in the United States.

	Boy	Girls	Poor	Not Poor	Black	White
Beginning of Kindergarten	-0.203	0.210	-0.241	0.063	-0.249	0.083
End of Kindergarten	-0.199	0.205	-0.247	0.065	-0.291	0.091
First Grade	-0.193	0.199	-0.203	0.055	-0.266	0.075
Third Grade	-0.203	0.209	-0.281	0.082	-0.334	0.077
Fifth Grade	-0.247	0.255	-0.276	0.076	-0.323	0.058

Table 5: Social and Behavioral Skills Measured in Kindergarten Through Fifth Grade (DiPrete & Jennings, 2012)

10. Appendix: Income Inequality Within Countries

Figure 27 shows inequality trends in terms of income within countries. While inequality within countries weighted by population decreased, inequality without taking population into consideration slightly increased. A boost of growth in many populous developing countries such as China and India account for the majority of the narrowing gap in income equality weighted by population (World Bank, 2000, p. 4).

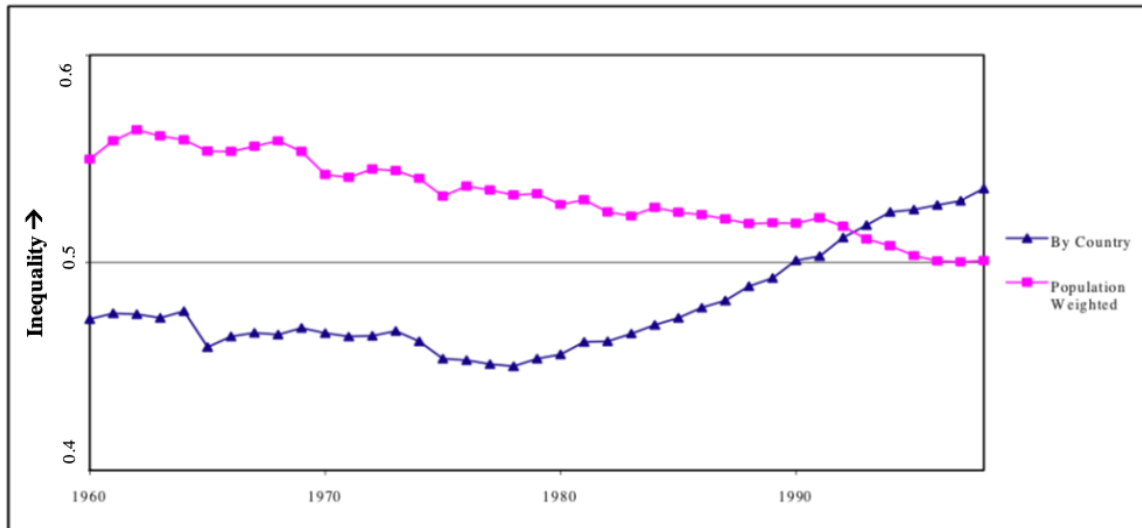


Figure 27: Inter-Country Inequality (World Bank, 2000, p. 4) referring to (Milanovic, 2000)

11. Appendix: Proportion of Advanced Degree Recipients in Certain Field of Study

The left chart in Figure 28 represents the proportion of female advanced degree recipients relative to all female advanced degree recipients in certain specialties in the United States. The right chart indicates the same for men.

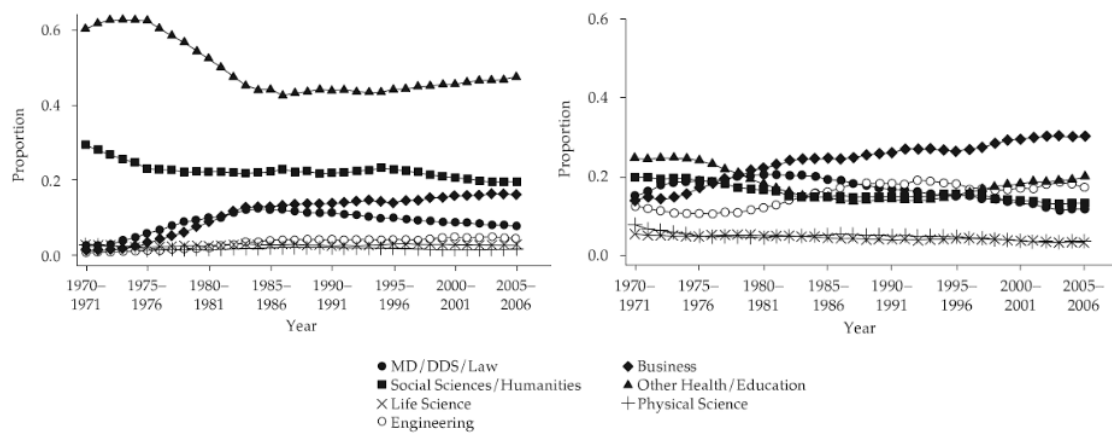


Figure 28: Proportion of Female Advanced Degree Recipient in Indicated Speciality (DiPrete & Buchmann, 2013) Based On (Snyder, Dillow, & Hoffman, 2008)

12. Appendix: Tertiary Degrees Awarded by Gender Over Time

Figure 29 shows an upward trend of the amount of women in the United States who received a master’s, doctoral or a professional degree in 1969/1970 to 2009/2010.

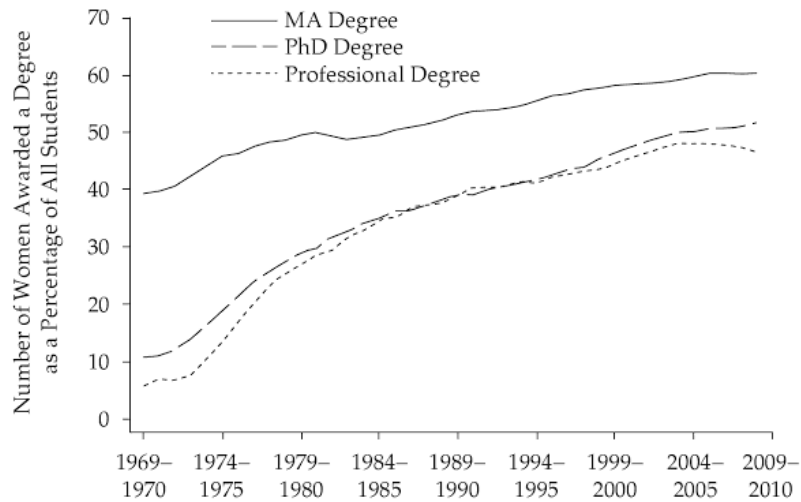


Figure 29: Women’s Share of Master’s, Doctoral, and Professional Degrees Awarded (Snyder et al., 2008)

Figure 30 represents the upward trend of women in the United States completing a bachelor’s degree or higher diploma in 1919 to 1980.

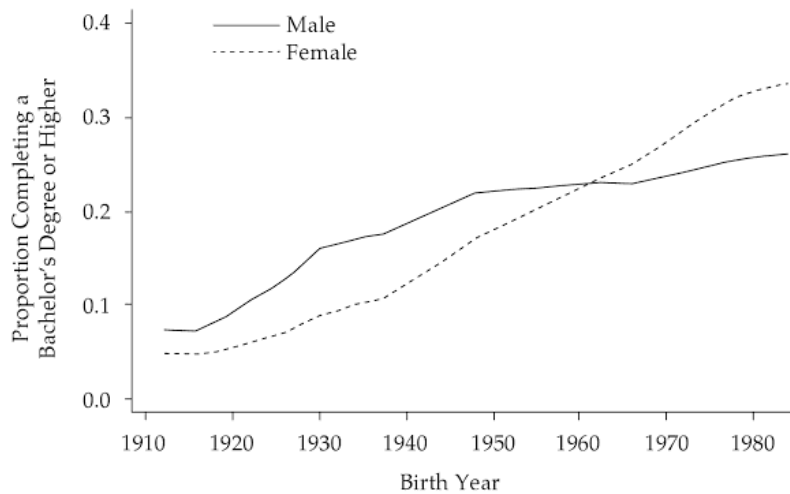


Figure 30: Proportion of 26 to 28 Year-Olds With a Bachelor’s Degree (Ruggles et al., 2010; U.S. Census Bureau, 2010)