PhD graduates in Europe. Gender differences in the PhD degree's labour market benefits

Abstract¹

The aim of this paper is to assess the characteristics of PhD holders in Europe and the labour market benefits of their PhD degree according to gender. Our research was conducted on the basis of the European Social Survey (ESS) 2012. First we deal with horizontal and vertical segregation by gender in the academic field. In the empirical part, we deal with the socio-demographical background of the PhD graduates in Europe focusing on gender differences. In the second part we deal with professional career paths of PhD holders according to gender. Our results show that women are underrepresented among PhD graduates and have additional disadvantages. Female PhD holders are more likely to live in big cities and are younger than their male counterparts. Male PhD holders had better ratings of subjective economic status. Furthermore, women with a PhD degree are more likely to come from families with mothers with a high educational level. Concerning the professional career paths, males work in managerial jobs in a higher proportion and can reach higher income levels compared to women. Our last result is that harmonising work and private life is difficult for highly educated female PhD holders.

Key words: PhD graduates, labour market benefits, gender differences, European data.

Absztrakt

PhD-fokozattal rendelkezők Európában. Nemi különbségek a PhD-fokozat munkaerőpiaci megtérülésében

A tanulmány célja a PhD-fokozattal rendelkezők áttekintése Európában, a fokozat munkaerőpiaci megtérülésének és ennek nemek szerinti különbségeinek feltárása. Vizsgálatunkban a 2012. évi European Social Survey (ESS) kutatás adatbázisát használtuk fel. Elsőként a horizontális és a vertikális szegregáció elméleti hátterét ismertetjük. Az empirikus részben a fokozattal rendelkező férfiak és nők szocio-demográfiai ismérveit hasonlítjuk össze, majd a szakmai karrierutakat. Eredményeink azt mutatják, hogy a nők alulreprezentáltak a PhD-fokozattal rendelkezők körében, nagyobb valószínűséggel élnek a nagyvárosokban és fiatalabbak a férfiaknál. A férfiak szubjektív gazdasági helyzete jobb, a nők pedig hátrányban vannak abban a tekintetben is, hogy a fokozatszerzők inkább a magasan iskolázott anyák gyermekeiből kerülnek ki. A szakmai pályafutás kapcsán a férfiak nagyobb arányban dolgoznak vezetői pozícióban, és magasabb jövedelmi szintet érnek el a nőkhöz képest. Végeredményképp kimutatjuk azt is, hogy a PhDfokozattal rendelkező nők számára nehézséget okoz a munka és magánélet összehangolása.

Kulcsszavak: PhD-fokozat, munkaerőpiaci megtérülés, nemi különbségek, európai adatok.

Introduction

Several research studies can be read about PhD graduates in developed countries that deal with the effect of the Bologna system on PhD training. Their results show that more and more students come from low economic status families also in PhD training nowadays. They also declare that more and more women obtain a PhD degree as well (Nerad – Heggelund 2008). The appearance of the knowledge economy, the internationalisation of PhD training and the growing governmental supervision of PhD training foster internal diversity within higher education and research as well as external diversity in the contribution made to the economy and the growing variety of careers for those who have completed doctoral training (Enders 2004).

The main aim of this paper is to assess the characteristics of PhD holders in Europe and the labour market benefits of their PhD degree according to gender. Our research was conducted on the basis of the European Social Survey (ESS) 2012, which was launched by the members of the European Commission in 2001. The aim of the ESS is to

¹ This paper based on a project that is receiving funding from the National Research, Development and Innovation Office (NKFI – K116099 – Career models and career advancement in research and development. Different patterns and inequalities in labour market opportunities, personal network building and work-life balance).

obtain internationally comparable data about the demographical status of European societies, the changes of the political and public life preferences of the population and the changes in societal attitudes. The ESS 2012 survey was conducted in the following countries: Albania, Belgium, Bulgaria, Switzerland, Cyprus, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France, United Kingdom, Hungary, Ireland, Israel, Iceland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Russian Federation, Sweden, Slovenia, Slovakia, Ukraine, Kosovo. Our empirical data processing was extended to those highly educated ESS survey respondents who command an institutionalised type of cultural capital, namely a PhD degree and/ or a Professor's Title. The ESS sample contained 405 such persons across all participating countries (N=405) whose characteristics will be analysed hereafter.

The advantage of the ESS database is that we can analyse the further career path of the PhD graduates and we can get information about older PhD graduates as well since the vast majority of the research studies deal only with current PhD students in their papers. Our goal is to compare the career path and the social background of male and female PhD graduates. Due to that fact that the sample of PhD graduates is quite moderate we cannot analyse the regional differences inside Europe. We have only one possibility to compare the ESS data with a Hungarian research study which investigated PhD graduates in Hungary in 2008–2009, also focusing on gender differences on quite a large sample.

Our paper has two main parts. First we deal with horizontal and vertical segregation by gender in the academic field. In the empirical first part we deal with the socio-demographical background of PhD graduates in Europe focusing on gender differences. In the second part we deal with professional career paths of PhD holders according to gender.

Horizontal and vertical segregation by gender in academic field

In the developed countries, vertical segregation in education and its research can be presented in three forms (Jacobs 1996, 1999):

1. The higher the level of education the lower is the proportion of females (although we

have seen that nowadays the proportion of females in doctoral courses is around 50% in Hungary).²

- 2. The proportion of females is lower in elite institutions and higher in part time training, which is less prestigious (furthermore, up until the 1990s, relatively more women studied at colleges than at universities).
- 3. Finally, the proportion of women in higher education is decreasing among lecturers and researchers while the academic level and position are increasing.

The fact that relatively few women choose an academic career is an indicator of vertical segregation. This may be explained by the traditional division of labour as well as women's classical mother and wife roles (women's task is bringing up children and housework; women's professional advancement is secondary compared to men). Women's advancement is further hindered by the masculinity of power (men take leading positions, even if they have similar qualifications and professional knowledge). Internal hindrances are also present as women usually have lower self-esteem, accept traditional roles, subordinate their careers to family tasks, and tend to avoid conflicts. Furthermore, financial factors are also important (as the infrastructure is underdeveloped to support housework and family tasks) (Kissné 2002, 2005; Tornvi 2009).

There are few women in STEM fields as well as, generally, in academic professions (Paksi – Nagy – Király 2016). It can be shown that some women give up their academic career for the purpose of maternal tasks. Few women become researchers; and we cannot encounter many women at the peak of academic careers, either. The "leaky pipeline" metaphor depicts how some women leave their academic careers (Paksi 2014; Blickenstaff 2005).

The "leaky pipeline" occurs in multiple steps. Firstly, many talented women choose not to pursue a career in natural sciences and engineering (see above for the causes of this phenomenon). Secondly, even if they have chosen so, many females leave their academic careers or drop out, especially

² There is an inverse pyramid phenomenon in engineering and computer science. While the ratio of females is 17-25% in bachelor degree programmes, it is 22-30% in master degree programmes, and even higher among lecturers (some 40% in computer science, 33% in engineering). Teaching computer science is a rather feminine field, as males tend to seek employment in the private sector.

during doctoral studies, or during decisions and transition periods between career stages. Finally, for the reasons above, fewer women become university professors and scientific researchers, especially in STEM fields (Paksi 2014).

The causes of the "leaky pipeline" are complex; they include influences of socialisation as well as dominant gender roles and stereotypes in a given society. Furthermore, the masculine worldview of science, according to which females are more emotional while males are more rational and therefore more likely to pursue academic careers, also plays a role. Another influence could be that curricula are biased; especially the so-called "hidden curriculum", that is, educational culture, may divert females from careers in research and STEM fields (Paksi 2014).

England et al. (2007) have pointed out that in the US between 1971 and 2002, the ratio of women obtaining a PhD degree increased from 14% to 46%, while horizontal segregation by gender changed only slightly. Feminisation only increases where there are many women to start it. Women cannot reach a critical mass in male-dominated fields. (Charles - Bradley (2002) have reached similar findings in their cross-national comparative study.) England et al. (2007) have also revealed that men avoid fields with many women (men tend to "flee" where the ratio of women is higher than 25%). Nevertheless, it could be shown only partially that feminised fields are underrated by the labour market. It may also be the case that women opt for fields with declining labour market value.

Results

The socio-demographical background of PhD graduates

The differences according to gender are significant in the surveyed European countries. Women are in a minority among PhD holders in comparison to men. Thus the disadvantage of being a woman can be detected in the academic sphere; however, women are in the majority in secondary grammar schools, among tertiary students and in prestigious university courses according to investigations in developed countries (Forray 1986; Róbert 2000; Freeman 2004; Fényes 2010).

According to the type of the settlement of the permanent residence, the majority of the European PhD graduates lives in a big city (38%), or on the fringes of a big city (19.5%), or in a small town (26.2%).

According to our results, the type of the settlement of male and female PhD holders differ significantly. Regarding the type of the settlement of the permanent residence, women are in a more favourable position; a higher percentage of them live in big cities, while a smaller proportion live in small cities or farms. This, however, could be interpreted as a female disadvantage, too, as women have to live in better types of settlements to have a chance for attaining a PhD degree.

Different age groups were created, according to which the underage people (18-25 years) are represented within the sample of European PhD holders at 0.2%, early adults (26-34 years) at 14%, middle-aged people (35-49 years) at 30.7%, mature adults (50-64 years) at 32.9% and elderly people (over 65 years) at 22.2%.

According to our results, different age groups are typical for male and female PhD holders. The advantage of being a man can be detected among those in their mature adulthood and ageing people, and women with PhDs can hardly be found among el-



Figure 1: Distribution of PhD holders in Europe by gender (%) (N=405)



Figure 2: Distribution of PhD holders in Europe by the settlement type of their permanent residence and gender (%) (N=405)

p=0,001

Figure 3: Distribution of PhD holders in Europe by age groups and gender (%) (N=405)





p=0.000

Table 1: Mean of the number of people living in a household among PhD holders in Europe (N=405)

| Mean | Standard deviation | |
|------|--------------------|--|
| 2.70 | 1.241 | |

Table 2: The subjective evaluation of the social status among the PhD holders in Europe by gender (N=394)(mean of the scale 1-10)

| | Mean | Standard deviation |
|--------|------|--------------------|
| Male | 7.04 | 1.439 |
| Female | 6.66 | 1.546 |
| Total | 6.89 | 1.490 |

derly people. On the other hand, female PhD holders are younger and their rate is significantly higher than that of men among PhD graduates in their early and middle adulthood. In recent times the dynamics for earning a PhD has changed between men and women. This phenomenon could be caused by the fact that the inequalities of the participation in education have been moderated and the gender differences in the level of education have decreased significantly as well (Nagy 2005; Fényes 2010).

Concerning the number of people living in a household, it can be stated that the difference between men and women is not significant: the family consists of about three members in average in case of both genders.

Regarding the family status of the responders, it can be said that 82.5% of them live in a marriage and 14.5% live in some kind of registered partnership. Only one person in the sample of responders is divorced.

According to our results, the family structure of males and females does not differ significantly. Regarding gender, similar family status emerges, however, there are more married people among men while more registered partnership can be seen among women. These results contradict the results of Jedlik Ányos Project (NFEKUTMO, NK-FP-B3-2006-0003), according to which the rate of married women with a PhD is lower than that of single female PhD holders in Hungary (Schadt 2011; Fényes 2018).

Partly because of the social norms (the transformation of the habits of founding a family, the increase of educational level, the higher age when giving birth and the changes in personal values and social roles of females), partly because of economic progresses (the deterioration of the labour market, existential fears, the imperfection of the child care system), the willingness to have children among the European PhD holder population is not high. Of the European inhabitants with a high educational level only 42.9% have a child, while 57.1% of them do not have children.

According to the results of the investigation regarding gender, no differences can be detected in the number of children between males and females, contradicting the results of Jedlik Ányos project (NFEKUTMO, NKFP-B3-2006-0003), which showed that women with a PhD have fewer children in comparison with men. In the case of the subjective evaluation of social status on a scale from 1 (low status) to 10 (high status), PhD graduates classified themselves at the seventh level on average, into the intersection of the middle and high-middle social levels.

The subjective assessment of the social status differs significantly according to gender; the male PhD holders' evaluation of their subjective social status is much more preferable in comparison with that of women. An underlying reason explaining the differences could be that discrimination in the workplace brings women into a disadvantaged situation with an impact on subjective well-being. Vertical segregation plays an important role as well, according to which women take their place in the hierarchy where income is lower. Furthermore, it is typical for women to work at a higher rate in lower paying sectors (such as public administration), but taking part in the private and entrepreneur sphere, which pays better, can be seen at a lower rate among them. Besides, the reason of the lower incomes is the fact that the labour market valorises the "masculine" jobs against the "feminine" jobs (Fényes 2010).

Family background is one component of the human capital which is characterised by the educational level of the individual's parents. According to our previous experiences, people with intellectual background select high prestige schools more frequently. During our investigation, we were curious about the educational level of both the mother/ foster-mother and father/foster-father, which was determined on the basis of the highest degree.

Related to the educational background of PhD holders' parents, it can be seen that 41% of the mothers/foster-mothers have at least primary level education, one third of them completed secondary education and 25.3% earned a college or university degree or PhD, which is due to the fact that the educational level of women was much lower in the past.

Our results according to gender confirm that in the case of a huge share of men (47.5%) the mothers only completed primary education. Among them, the mothers of females with a PhD have a high educational level at a higher rate. This is due to the fact that the rate of females in the educational system is continuously increasing and thus their educational level increases as well (Fényes 2010). Females with a PhD are in a disadvantageous status in this regard too as their mothers have a high educational level as well.



Figure 4: Distribution of the highest educational level of PhD holders' mothers/foster mothers by gender (%) (N=384)

p=0,000

According to the fathers'/foster-fathers' educational level of PhD graduates, it can be stated that the rate of people having at least primary educational level is 23.7% which is significantly lower than the ratio of the mothers (41%). This shows that men's educational level was remarkably higher in comparison with that of women. 35.1% of fathers/foster-fathers have a secondary educational level qualification (skilled labour certificate, having A-level exams from a secondary grammar school or vocational school, or took vocational training on the basis of their A-level exams). Fathers who have a degree (graduated in college, bachelor level, university, master level, PhD level) are at the peak of the hierarchy of the education system: 41.3% of the fathers/foster-fathers participating in the sample have a qualification at these levels, which greatly exceeds the tertiary level qualification of the mothers (25.3%). This contradicts the homogenisation of the relationships, which can be seen nowadays.

Regarding the results according to gender, no significant difference exists between the fathers'/foster-fathers' educational level of males and females, however, the effect of the mothers is more important regarding the career of females and a mother with a higher educational level is a necessary preconfition for the PhD graduation of a female.

Further to the educational level of the parents, we have examined the educational level of the spouses of the PhD graduates. It is characteristic of the partners' educational level that the rate of spouses without a degree is only 18% while the rate of those who have a certificate or a degree is 81%. These ratios can be regarded as favourable and can be explained with the homogenisation of the relationship.

The difference between the educational level of the males' and females' spouses is almost significant: a small advantage of the males and husbands can be shown. In the background of the similarities of the results can stand the fact that the educational level of females has been increasing in the past decades (Fényes 2010), however, the partnership homogenisation tends to shape that as well (Fónai – Szigeti 2016).

Professional career paths

Women entered the labour market as a breadwinner in large numbers in the 19th century. The employment of women could be characterised with bad working conditions and low incomes. In the 20th century, the progression of the feminisation of jobs with low prestige (the phenomenon of horizontal segregation), vertical segregation (few women are in leadership positions) and discrimination in the workplace (women earn lower salaries for the same jobs as men) started (Fényes 2010).

We have also investigated the differences of professional career paths according to gender based on the ESS sample. Women – as will be seen below – are in a disadvantaged position in the labour market as a status consistency develops between the labour market and the educational status of the females.



Figure 5: Distribution of the level of education of PhD holders' spouse by gender (%) (N=290)

p=0.058

For the "Did you have a paid job for more than an hour in the previous week?" question, it could be stated that almost 95% of the PhD graduates worked in the last seven days; a rate that can be qualified as remarkably favourable, but only 96 PhD graduates answered this question.

Investigating according to gender, it was determined that no significant difference existed between the last week's work activities of men and women. Regarding the PhD graduates in the whole sample, it can be allocated that most did do paid work (69.7%); however, the numbers of the participants are small. In the case of the categorisation of men's and women's activities in the week preceding the survey, a significant difference can be seen. A higher rate of the surveyed females claims that they did paid work in the last week, and there are more pensioners among men. Of course, doing housework and parenting seems to be a principal activity of everyday life in the case of the females. We also have to declare that the number of the participants, who answered this question, is small.

Figure 6: The distribution of PhD holders in Europe by the type of activities performed the week before and gender (%) (N=80)



Investigating the type of profession, it can be detected that the vast majority, almost nine tenth of the European population with a PhD is an employee (87%), a smaller part (13%) of them is entrepreneur which is in accordance with the expectations.

According to the investigation in regard of gender, no considerable difference exists between the type of profession of males and females. As we could see, the vast majority of the occupied people are employees. Now we will see what type of contract these employees work with. The majority of the employees with a PhD works based on a contract with an undetermined time limit (75.6%); however, a small part of them (21.9%) is employeed with a time-limited contract. The rate of employees without a contract is insignificant.

According to our results, the type of labour contract of males and females does not differ significantly, against to our expectations.

The hierarchical structure of professional levels reminds us of a pyramid for which is firstly typical that in the higher levels take part fewer people than in the lower levels The high educational level can be mentioned for the first criterion of reaching the higher level which is strengthened by the responses for the "Are you in a leadership position?" as the majority, 54% of people with PhD works in a leadership position in day-to-day life.

Women are in a disadvantaged position regarding both the chance of the entry into employment and the mobility in the employment. This causes conflicts not only on individual level, but it is not favourable for the society, either (Koncz 1994).

For the question "Are you in a leader position?" 62.3% of the surveyed males and 40.1% of the females answered yes. The difference between these two distributional ratios is significant which can be identified with the "glass ceiling metaphor". It can be known from the more and more extended national and international literature that the rate of female leaders increased significantly in the past decades in the economies of developed countries, however, this change has not particularly reached senior management levels where women can only enter sparsely (Fényes 2010).

Among individuals in a leader position, we found it important to investigate how many subordinates they have and how many colleagues' work processes they coordinate and control. According to our results, the average number of employees linked to the leaders with a PhD is 83. It has to be noticed that a huge standard deviation can be detected among the different leaders as there are leaders who supervise only one person, but at the other extreme, there are others who supervise at least 5000 individuals. No difference can be seen regarding the number of subordinates, although males determine more subordinates' tasks.

Measuring the weekly work time, we regarded number of hours actually worked (including overtime). According to our calculation, respondents spend 45 hours at work on a weekly basis, on average.

A significant difference exists between males and females in the number of hours spent with work in a week. Males work significantly more in a week, approximately 6 hours. Males are usually able to spend more time with work in the workplace as their essential task is "traditional" and a "status indicator" (Fónai – Szigeti 2016).

Regarding the question related to working abroad, it can be stated that it is not typical (17.5%) even for the individuals with a high educational level, contrary to expectations. No significant difference can be detected regarding gender.

We were curious whether individuals with a PhD have ever experienced that they wanted to work but were not able to find a job; despite being of working-age. The ratio of the respondents who have experienced unemployment is relatively favourable (21%). No difference exists between males and females with regard to having been unemployed.

Job satisfaction is the central element and essence of work attitudes, which is an important factor in regard of individual and social level as well. The subjective work satisfaction of PhD graduates can be qualified well as it takes part on the 8th level on a one-to-ten scale.

Our results according to gender show that males are significantly more satisfied with their work than females. This can be explained with the fact that the rate of females decreases with moving higher and higher in the employment hierarchy corresponding to vertical segregation. In this context, males work in higher positions, a status which implies a higher income as well. On the other hand, it is well known that males mobilise less time and energy in regard of household chores and parenting.



Figure 7: The distribution of PhD holders in a leadership position by gender (%) (N=404)

p=0.000

Table 3: Mean of the number of subordinates among PhD holders in Europe (N=213)

| Minimum | Maximum | Mean | Standard deviation |
|---------|---------|-------|--------------------|
| 1 | 5000 | 83.42 | 446.313 |

Table 4: Mean of the number of hours spent with work in a week by gender (N=372)

| , , | 5 1 | 28 | |
|--------|-------|-----|--------------------|
| | Mean | N | Standard deviation |
| Male | 46.87 | 238 | 14.041 |
| Female | 40.39 | 134 | 15.094 |
| Total | 44.53 | 372 | 14.743 |
| | | | |

p=0.000

| | Mean | N N | Standard deviation |
|--------|------|-----|--------------------|
| Male | 8.22 | 185 | 1.314 |
| Female | 7.67 | 121 | 1.927 |
| Total | 8.01 | 306 | 1.604 |

Table 5: The mean of the scale (1-10) of job satisfaction by gender (N=306)

p=0,003

Table 6: Mean of the scale (1-10) of satisfaction with the coordination of work and private life by gender(N=308)

| | Mean | Standard deviation |
|--------|------|--------------------|
| Male | 6.98 | 2.188 |
| Female | 6.28 | 2.675 |
| Total | 6.70 | 2.414 |

The subjective assessment of the coordination of work and private life can be interpreted and moderate because it is at the 7th level on a one-to-ten scale.

Women have a below average satisfaction level. Harmonisation of family life and a professional career and the formation of a double-bonding career has been a problem for decades, which crops up nearly always in the case of females (Koltai – Vucskó 2007; R. Fedor 2015). Society and the labour market demand that women harmonise household activities with the requirements of their job and find a solution for the synchronisation of the two roles (R. Fedor 2015). Nevertheless, the harmonisation of these two roles is not an easy task, which can be seen well in the case of the males' and females' satisfaction level as well.

In the case of the investigation of the financial background, we analysed the subjective and objective status separately, according to gender.

Firstly, we measured the objective indicator of the financial status with the categorisation of the values in deciles. Income deciles from the 1^{st} to 5^{th} level were categorised into the low level of income while those from 6^{th} to 10^{th} deciles were put into the high level of income. As can be seen as well, the vast majority (80%) of people with high educational level can be categorised into the higher income group. According to this objective indicator of financial status, the situation of the males is significantly better. This can be interpreted with the phenomenon that the manager positions are usually filled up by males, which correlates with higher wages too. It is also well known that females working in the same job get a lower salary in comparison with males (gender pay gap). The proportion of men is 10% higher (84.2%) than that of women (73.3%) in the case of the higher level of income.

Regarding the subjective assessment of the financial situation, it can be said that a significant ratio of the respondent PhD graduates (53.2%) are satisfied with their salary which is comfortable for the month. With care, monthly earnings could suffice for 37.3%, but not comfortably. Only 9.5% reported that their income was not enough and that they needed more.

The subjective evaluation of the financial background differs significantly according to gender. It is obviously more typical for men that they can live from their wage and don't have to face financial problems. The causes can be attributed to those discussed above.



Figure 8: Assessment of income position, according to gender (%) (N=401)

[■] Male ■ Female

Summary

In the first part of our study, we measured the socio-demographical criteria of men and women with a PhD degree in Europe.

In the ESS sample, women are underrepresented among PhD graduates. Female PhD holders are more likely to live in big cities and are younger than their male counterparts, as women's flow into the academic sphere has become more dynamic in recent years. On the other hand, no significant difference could be detected with regard to the family status of the two genders, which is not necessarily the case in all European countries, like in Hungary where women with PhD degrees have fewer children and are less likely to be married. Male PhD holders had a better rating of subjective economic status. Furthermore, women with a PhD degree are more likely to come from families with mothers with high educational level.

In the second part of our study, we compared the professional career paths according to gender differences. The ratio of paid employment was similar for both genders. Strangely, no significant difference existed in the type of labour contract (determined or undetermined) and in the position (employee or entrepreneur) according to gender on the European level, although men were significantly more frequently in managerial positions in accordance with the glass ceiling phenomenon. Male PhD holders tend to work more hours per week and are more satisfied with their job than female PhD holders. Consistently with the higher ratio of managerial jobs and average working hours, men with a PhD degree can reach higher income levels compared to women. On the other hand, data from the ESS sample reinforced the expected result that harmonizing work and private life is not only more difficult for employed women in general, but also for the highly educated female PhD holders in particular.

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