Gender gap in pay expectations: the role of sex segregation in education

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Abstract

This paper deals with gender differences in pay expectations. Using data from 2006-2017 Labor Force Survey for Poland it shows that the size of the gender gap in expected pay amounts to -10%, which is almost twice less than the gender pay gap reported for working population. Inequality in pay expectations does not appear to be driven by men's and women's characteristics, including their choice of the field of education, but by their different 'expected returns' to these characteristics. In particular, men and women have different 'expected returns' to fields of education that may be defined by the degree of sex segregation. While women educated in 'male' dominated fields do not expect to receive neither lower nor higher pay, men educated in 'female' dominated fields expect to receive higher pay than their colleagues studying in 'gender neutral' fields. These results are interpreted in light of two hypotheses: (1) positive selection of individuals to fields dominated by the opposite sex, and (2) the internalization of existing gender norms and expectations concerning productivity.

Keywords: Gender inequality, gender wage gap, pay expectation, sex segregation in education.

JEL codes: J16, J31, J24

1. Introduction

The existence of the gender gap in pay is a well-known phenomenon that is widely documented in the literature. Previous research reveals that large part of the gap stems from gender differences in human capital endowments such as age, education, and work experience (Becker, 1971; Blau and Kahn, 1997, 2000, 2017), and gender differences in the characteristics of jobs and workplaces, and in particular occupational and sectoral sex segregation (e.g. Bayard et al., 2003; Blau and Kahn, 1997, 2000; Reilly and Wirjanto, 1999). Recently, however, other explanations for the existence of the gender gap in pay were proposed; these include for example men's and women's workforce structure and specifically women's concentration in lower-paid positions and their lack of representation among the management and directors (e.g. Tate and Yang, 2014), gender roles and work commitments, including the existence of the motherhood wage penalty (Cukrowska-Torzewska and Lovasz, 2016; Angelov et al., 2016), and gender differences in behavioral aspects such as risk aversion, non-cognitive skills, competition, and negotiation (Blau and Kahn, 2017).

Given recent focus on behavioral explanations of the gender wage gap, surprising little attention is dedicated to gender differences in pay expectations, which are key to wage negotiation process and consequently the final wage that is set upon employer's positive hiring decision. Clearly, if during the hiring process, women already indicate lower pay than men, their observed wage is also likely to be lower.

While there exists research that examines levels of reservation wages and their relationship to unemployment rates and spells, which includes seminal contributions of Lancaster and Chesher (1983) and Jones (1988), research on gender difference in pay expectation is still scarce. The exceptions include Brown et al. (2011), who analyzed determinants of the gender gap in reservations wages among unemployed individuals for the United Kingdom and Cukrowska (2014), who compared the size of the gap in reservation wages to the gap in observed wages in Poland. Yet, we still lack a proper understanding of the sources of gender difference in pay declarations or its changes over time.

This paper aims to address some of the areas the present research is missing. First, it documents the evolution of gender specific pay expectations as well as their relation to actually observed earnings over a relatively long period of 2006 to 2017. Second, it examines the role of individual field of education and gender segregation in education for pay expectations and the gender gap

with that respect. In particular, it shows whether the gender difference in pay expectation varies depending on the level of sex segregation that is specific to individuals' field of education.

There are two competing hypotheses stating how sex segregation in education affects pay expectations by gender and the resulting gender gap. On one hand, individuals that chose to obtain qualification in the field that remains dominated by the other sex, may represent a selected group of individuals equipped in desirable characteristics such as high interest in the field or high self-confidence. Such selection translates into higher expected productivity, and thus higher pay expectations. If this is the case, compared to individuals educated in *gender neutral* field, we would likely observe smaller gender gaps in pay expectations among individuals qualified in men dominated fields and larger gender gaps in pay expectations among individuals qualified in female dominated fields. On the other hand, while determining pay expectations, individuals that chose to obtain qualification in the field that remains dominated by the other sex, may internalize existing gender norms and undervalue their skills (e.g. in response to lower employment prospects). In consequence, gender gap in pay expectation would be larger among individuals educated in fields dominated by men and smaller among individuals qualified in "female" fields.

The size of the gender gap in pay expectations by the field of education is therefore difficult to assess *a priori*. Given the recent debate and policy actions aimed at increasing women's participation in STEM fields, which remain traditionally male-dominated and which are considered as key for future labor market prospects and a country's economic development (European Institute for Gender Equality, 2017), understanding the mechanisms behind pay expectations of men and women by education field, and consequently the gender gap with that respect, seems to be crucial for the future of equal pay for equal work policy.

The remainder of the paper is structured as follows. The next section discusses data and methods that are used to address the gender gap in pay expectations and its relation to sex segregation in education. Section three presents the results; it shows the evolution of the gender gap in pay expectations over time, its comparison to the respective gap among already working population, and the sources of the gap, with the special focus on the role of segregation in education. The results are then interpreted in light of the two hypotheses specified above. Finally, section four gives concluding remarks.

2. Data and methods

The choice of the database used for the analysis of the gender gap in pay expectations is dictated by the availability of the measure indicating expected pay. This paper uses 2006-2017 Labor Force Survey (LFS) for Poland, in which all unemployed individuals are asked the following question: "What would be the minimum monthly pay for which you would agree to start a job?". The answer to this question is used to define the minimum expected pay. Because individuals provide minimum monthly earnings that are enough for them to accept a job offer, the analysis focuses on monthly earnings rather than hourly wages that are usually used to define the concept of a reservation wage, as well as the gender wage gap.

Because men and women may have different pay expectation depending on their labor market experience and, most importantly, previous earnings, the sample used in the analysis of gender gap in pay expectations is restricted to unemployed individuals entering the labor market for the first time. This allows to account for any effect on pay expectation that stems from labor market discrimination based on gender (e.g. women declaring lower expected pay in response to lower earnings received in past). The sample consists of 25,615 individuals.

In the first part of the analysis, the gender gap in pay expectation is compared to the gap in monthly earnings of men and women that are already observed working in the market. By definition, men / women that are already working differ from unemployed men / women entering the labor market for the first time in their experience; I thus restrict the sample of working individuals to those who work in the first job[1]. The summary statistics of key characteristics of the two samples are presented in Table 1. In general the two samples are comparable in terms of their characteristics, though there are some dimensions in which they slightly differ. For example, individuals that are already working in their first job are slightly better educated than unemployed individuals searching for a first job. Also individuals that are already working in their first job tend to be living in the bigger cities, while individuals that search for a first job are more likely to live in villages.

In order to control for these differences between samples I match them in pairs using propensity score matching (PSM); (for each gender separately). In this setup each unemployed man / woman is considered as "treated", and the working counterpart as a "control". For each gender (j={*male, female*}), the propensity score is estimated using probit model, which controls for

[1] That is individuals who report zero years of experience.

variables presented in Table 1. To improve the matching, the continuous variable measuring age is recoded to dummy variables for age groups: 16-21, 21-25, 25-30, and more than 30.

Table 1. Comparison of characteristics for (1) the sample of unemployed individuals searching for a first job, and (2) the sample of individuals already working in their first job

	(1) Sample of unemployed searching for a job reporting expected pay		(2) Sample of working individuals with zero experience reporting pay	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Age	24.538	5.658	23.113	4.215
Education: University (BA or higher)	0.170	0.376	0.233	0.423
Education: Secondary vocational	0.262	0.440	0.295	0.456
Education: Secondary - high school	0.176	0.381	0.218	0.413
Education: Vocational	0.222	0.416	0.137	0.343
Education: Primary or less	0.169	0.375	0.118	0.322
Married	0.137	0.344	0.116	0.320
Divorced	0.013	0.112	0.007	0.080
Female	0.502	0.500	0.519	0.500
Field: General	0.345	0.475	0.336	0.472
Field: Humanities, arts, education and pedagogy	0.047	0.211	0.064	0.245
Field: social science, economics, law	0.141	0.348	0.161	0.368
Field: science	0.048	0.214	0.061	0.239
Field: engineering, production processes, construction	0.226	0.418	0.201	0.400
Field: agriculture and veterinary	0.034	0.180	0.026	0.159
Field: social care, health	0.022	0.146	0.033	0.180
Field: services	0.137	0.344	0.117	0.322
City: more than 100 th. Inhabitants	0.203	0.402	0.258	0.438
City: 20-100 inhabitants	0.179	0.383	0.170	0.375
City: les than 20 inhabitants	0.133	0.339	0.129	0.335
Village	0.485	0.500	0.444	0.497
N	25615		9300	

The second part of the analysis focuses on the sources of gender gap in pay expectations, and particularly on the relation between the sex segregation in education and pay expectations by gender.

To the extent to which the choice of job is determined by the field of education, the gender gap in pay expectation might be driven by sex differences in fields of studies. For example more men than women tend to choose education in humanities, arts and education that increase chances of working in jobs that are relatively low paid and more men than women tend to choose technology and engineering related education, for which there is a high demand for highly skilled specialists and thus the average pay is higher. Part of the gap in pay expectation could be thus attributed to sex segregation in education.

To test this hypothesis, I run a decomposition of the gender gap in expected pay using standard Oaxaca-Blinder decomposition (1973) and portion out the part of the gap in expected earnings that is explained by differences in men's and women's choice of the field of education, and

other factors such age, marital status, level of education, number of moths of unemployment, and place of living, as indicated in Table 1.

Finally, to assess the role of sex segregation in education, I examine gender gaps in expected earnings by individuals' fields of education that are classified based on the degree of sex segregation. To test how sex segregation in education affects men's and women's expected pay, and consequently the gender gap in pay expectation, I run regression models regressing male and female expected pay on individual characteristics and fields of education grouped by the degree of sex segregation.

3. Results

3.1. Gender gap in pay expectation vs. gender gap in pay

Figure 1 presents mean gender gaps in minimum expected pay for the sample of unemployed individuals searching for the first job along with the gaps in (observed) pay for already working individuals. For comparative purposes gaps are derived for three samples of working individuals: (1) all working individuals irrespective of their experience, (2) individuals working in their first job (reporting zero experience); (3) individuals working in their first job that have been matched with unemployed individuals using PSM. The presented data are averaged over the years 2006-2017. Figure A.1. in Appendix additionally shows the evolution of the gaps over time.

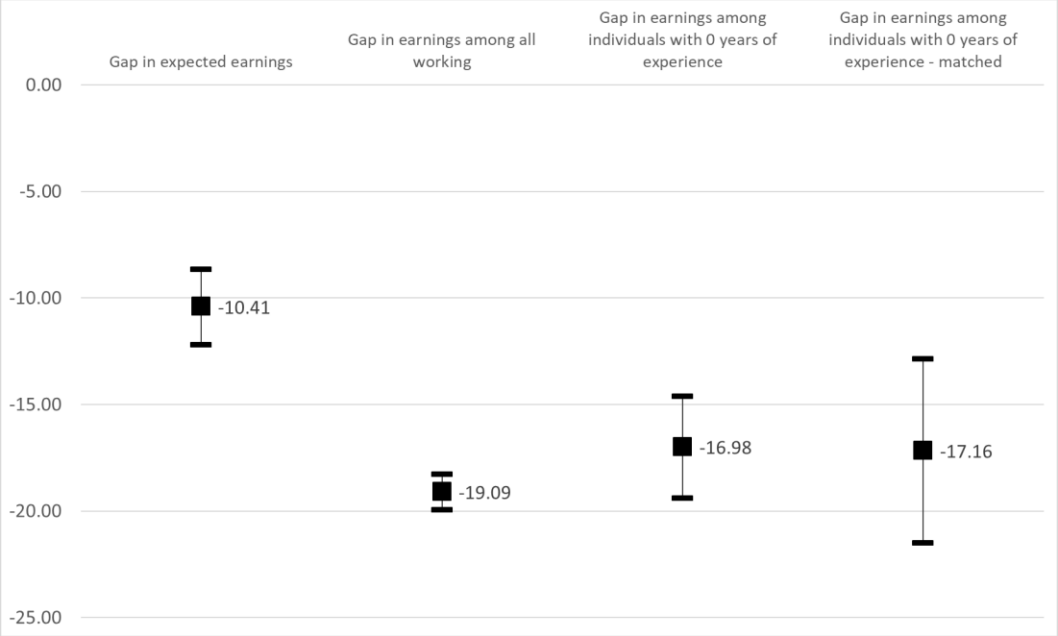
The results indicate that the mean gender gap in expected pay is around -10%; which can be interpreted that women declare by 10% lower pay expectations than men.[2] This gap is almost twice smaller than the gap between all working men and women that amounts to -19%. It is also smaller that the gap between men and women that work in their first job (-17%). The difference between the gaps among unemployed individuals and those that work in their first job does not stem from different distribution of their characteristics as indicated by the comparison of the size of the gap for unemployed sample and the matched sample of first-time employees using the PSM. For the matched sample the gap is still around -17%.

Figure 2 additionally plots mean expected earnings (for unemployment sample) and mean obtained earnings (for the sample of individuals working in the first job) by gender and time. The figure shows that for both men and women expected earnings are higher than actually

[2] The gap is defined as the difference in mean pay between women and men divided by the mean pay for men.

obtained earnings, but the discrepancy between pay expectation and the received pay is greater for women than for men. In other words, both men and women receive less than they expect, but women to a higher extent than men.

Figure 1. Comparison of the gender gap in expected earnings among unemployed men and women (1), gender gap in earnings among all working men and women (2), gender gap in earnings among men and women working in their first job (3), and gender gap in earnings among men and women working in their first job that are matched with unemployed men and women (4).



Note: The graph presents mean gaps for the years 2006-2017 along with their respective 95% confidence interval.

Figure 2. Changes in expected earnings for unemployment men and women and received earnings for men and women working in their first job over 2006-2017.

3.2. Sources of gender gap in pay expectation: the role of sex segregation in education

We now move towards uncovering sources of the gender gap in pay expectation, with a special focus on the role of sex segregation in education. Sex segregation, and particularly the choice of different kinds of jobs by men and women has been found to be one of the main source of the difference in their pay. We can thus expect that the choice of education that determines the choice of job, may drive the gap between men and women in pay expectation.

In order to investigate to what extent differences in the choice of the field of education between men and women are responsible for the gap in their pay expectations, I apply Oaxaca-Blinder decomposition of the expected pay gap. The results obtained from the decomposition are presented in Table 2. Contrary to predictions, gender differences in the field of education contribute to the gender gap in expected pay only marginally, explaining only about 2% of the total gap. What is striking is that the 'unexplained' portion of the gap that is attributed to the different 'returns' to educational fields for men and women, equals virtually to the size of the gap. This suggest that the gap in expected pay is not due to different distribution of men and women across education fields, but rather due to different 'expected returns' that they claim given the educational choice. Given these results I proceed with investigating the role of 'expected returns' to education field with a special focus on the degree of sex segregation by the field of education.

Table 2. Oaxaca-Blinder decomposition of the mean gender gap in expected earnings

Gap	-0.104***			
	Explained		**Unexplained** ('adjusted gap')	
Age	0.002	-2%	0.026	-25%
Education	0.021	-20%	0.093	-89%
Marriage	0.010	-10%	-0.015	15%
Time of job search	-0.000	0%	-0.009	8%
Field of education	-0.002	2%	-0.103	99%
Region	-0.005	4%	-0.120	116%
Total	0.026	-25%	-0.129	124%

To better understand the role of sex segregation by the field of education for individual pay expectation, I drop from the sample individuals with general education. Individuals with general education do not represent a selected group of the original sample, as for the restricted sample the gender gap in expected earnings is still around -10% (-9.6%) and the explained portion constitutes around -25%, which is comparable to the previous results reported for the full sample. Moreover, to account for the degree of sex segregation by education field, I derive the

share of women in each education field and in each year, and based on the derived shares I define: (1) female dominated fields, (2) gender neutral fields, and (3) male dominated fields. While female dominated fields are fields in which the share of women is above 60%, male dominated fields are fields with the share of women lower than 40%.

Table 3 presents shares of women by education field averaged over years 2006-2017 along with respective gender gaps in expected earnings. From the Table we can infer that both the raw and adjusted pay gaps are smallest among individuals that are educated in gender neutral fields. On the other hand, the highest gaps are seen among individuals educated in female dominated fields, especially education and pedagogy. The notable exception among female dominated fields is 'social care and health' for which the gap is relatively small. This observation may stem from the fact that men and women that study health, are likely to differ by subfield – while women are more likely to study towards being a nurse or pharmacist, men are more likely to study towards being a doctor. Because the average wages for starting position as a doctor are rather low, especially compared to starting wages of pharmacists, the gender gap in this field remains small. Finally, the one field that remains heavily dominated by men, has an average gap in expected earnings of 10%, but once it is adjusted for individuals characteristics it increases to around 14%. To sum up, taking into account the distribution of men and women characteristics, the gaps in pay expectation observed among individuals educated in gender neutral field are smaller than among individuals educated in both – female and male dominated fields.

Table 3. Gender gap in expected earnings by fields of education and sex segregation

Field of education	Share of women	Category	Gender gap in expected earnings	Unexplained part of the gender gap ('adjusted gap')
Education and pedagogy	76%	Female dominated	-0.175***	-0.160***
Social science, economics, law	76%	Female dominated	-0.157***	-0.140***
Science	49%	Neutral	-0.018	-0.068***
Engineering, production processes, construction	24%	Male dominated	-0.101***	-0.144***
Agriculture and veterinary	50%	Neutral	-0.071***	-0.083***
Social care, health	84%	Female dominated	-0.083***	-0.055*
Services	67%	Female dominated	-0.104***	-0.121***

This finding is confirmed by the estimation of the regression in which the logarithm of expected (monthly) pay is regressed on female dummy interacted with the field of education categorized by the level of sex segregation (see Table 5). This Table also shows 'expected returns' to education fields by gender, which is helpful for understanding the mechanisms behind greater

gender gaps in expected pay occurring among individuals that are educated either in male or female dominated fields. Higher gender gaps in expected pay among individuals that are educated either in male or female fields are predominantly due to men's higher pay expectations, and not necessarily lower pay expectations of women. It is clear that men educated in male dominated field expect higher pay, whereas women that obtained education in 'male' field do not expect neither significantly lower nor higher pay (compared to women in neutral fields). This could imply that women studying in 'male' field neither represent a positively selected group of women that would claim higher pay expectations nor internalize existing gender norms and claim lower pay expectations. However, it can also be the case that both mechanisms are at place, leading to a zero effect of male dominated field of education on women's pay expectation, on average. On the contrary, for men educated in female dominated fields we observe a significantly higher pay expectation. This finding suggests that men choosing these fields are positively selected and have higher expected productivity that translates into higher pay expectations.

Table 4. OLS estimates from regressing natural logarithm of expected earnings on individual characteristics, including field of education characterized by the degree of sex segregation

	All		**Women**		**Men**	
Variable	**Coefficient**	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**
Female	-0.084***	0.011				
Female dominated field	0.022**	0.009	-0.012	(0.008)	0.023**	(0.009)
Male dominated field	0.036***	0.008	-0.004	(0.010)	0.040***	(0.009)
Female * female dominated field	-0.037***	0.013				
Female * male dominated field	-0.030**	0.012				
Age	0.002***	0.000	0.002***	(0.001)	0.002**	(0.001)
Education: University (BA or higher)	0.793***	0.112	0.663**	(0.278)	0.816***	(0.127)
Education: Secondary vocational	0.657***	0.111	0.529*	(0.278)	0.678***	(0.127)
Education: Secondary - high school	0.506***	0.136	0.350	(0.289)	0.700***	(0.218)
Education: Vocational	0.610***	0.112	0.497*	(0.278)	0.617***	(0.127)
Education: Primary or less (base)						
Married	-0.012*	0.006	-0.023***	(0.007)	0.037***	(0.014)
Divorced	-0.001	0.019	-0.027	(0.019)	0.210***	(0.066)
Number of months searching for a job	-0.000***	0.000	-0.001***	(0.000)	0.000	(0.000)
City: more than 100 th. Inhabitants (base)						
City: 20-100 inhabitants	-0.032***	0.006	-0.032***	(0.009)	-0.032***	(0.009)
City: les than 20 inhabitants	-0.018***	0.007	-0.024***	(0.009)	-0.011	(0.010)
Village	-0.036***	0.005	-0.038***	(0.007)	-0.033***	(0.008)
Constant	5.226***	0.112	5.298***	(0.278)	5.185***	(0.127)
Number of observations	16,784		8,437		8,347	
Adjusted R2	0.188		0.173		0.161	
Note: *** p<0.01, ** p<0.05, * p<0.1						

4. Conclusion

The paper examines pay expectations of men and women in Poland over a period of 2006-2017. Special attention is brought to the analysis of the role of sex segregation in education for pay expectations of men and women, and the resulting gender gap in expected earnings. Two competing hypotheses regarding the impact of sex segregation in education are considered. From one hand, individuals that choose to study in the field that remains dominated by the other sex, may represent a selected group of individuals that are endowed with desirable characteristics, such as grater self-confidence or interest in the field, which leads to greater expected productivity, and thus higher pay expectations. On the other hand, such individuals may be likely to internalize existing gender norms, and in response to them undervalue their skills.

The results indicate that the average gender gap in expected pay among individuals that enter the labor market for the first time is around -10% and it is almost twice smaller than the average gender gap in the economy (i.e. among all working individuals) that accounts to around -19%. There are some but rather minor fluctuation in the size of the gap in expected pay over time, with the greatest gap being reported around the beginning of the Great Recession.

Similarly to the gender gap in already received pay in Poland (Goraus and Tyrowicz, 2014), the gender gap in pay expectation does not result from differences in characteristics of men and women. It is rather driven by men's and women's different 'expected returns' to characteristics. Because the analysis deals with pay expectations and not with received pay of men and women that is observed in the market, as opposed to standard analysis of the gender gap, gender differences in 'returns' should not be interpreted as different 'treatment' of men's and women's characteristics by the labor market. Gender differences in 'expected returns' should be instead interpreted as stemming from internal valuation of own skills as argued by Cukrowska (2014), which may - but not have to - result from gender differences in the labor market (e.g. lower employment prospects of due to discrimination).

The results that relate to sex segregation in education reveal that there is heterogeneity in the size of the gender gap in pay expectation by field of education. Lowest gap in expected earnings is seen among men and women educated in gender neutral fields, such as agriculture and veterinary or science. Higher gap is, however, seen among individuals that are educated in both male and female dominated fields of education. The difference between the size of the gap

between male and female dominated fields is only marginal, with slightly smaller inequalities observed in male dominated field.

The examination of the 'expected returns' to fields of education grouped into neutral, female dominated of male dominated fields for each gender separately sheds additionally light on the mechanisms behind the link between sex segregation in education and gender gap in expected pay. In particular, it is shown that while women educated in male dominated field neither underestimate nor overestimate their pay expectations (compared to women educated in gender neutral fields), men that choose to study in fields largely dominated by women tend to expect higher pay than their colleagues that study in gender neutral subjects. This result shows that for women we don't observe any prevailing mechanism, and if anything both mechanisms – positive selection and the internalization of existing gender norms – are in place leading to zero overall effect. In the case of men, the results suggest that men that decide to study in female dominated fields likely represent a positively selected group of male individuals, who have higher expected productivity.

The existence of the gender inequality in pay expectations is an interesting topic that requires more attention in the future research. The question is whether women undervalue or men overvalue their skills because they are aware of their relative position in the hiring process. To answer this question one could compare pay expectations by gender with the salaries that are offered by employers.

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APPENDIX

Figure A.1. Evolution of gender gaps in expected and received earnings over time.