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Do higher skill levels lead to better outcomes? The disproportionality between skills and outcomes for women

Zusammenfassung

Führen höhere Kompetenzen zu größerem Erfolg? Ungleiche Effekte von Kompetenzen für Männer und Frauen

Wir wissen, dass auf dem Arbeitsmarkt eine Vielzahl von Mechanismen greift, die Frauen und Männer ungleich positionieren und deren Erfolgschancen beeinflussen. Dennoch bleibt in unseren meritokratischen Gesellschaften die grundlegende Annahme, dass höhere Kompetenzen und (persönliche oder gesellschaftliche) Investitionen in Bildung zu einer größeren Gleichberechtigung beitragen könnten. Doch trifft dies tatsächlich für Männer und Frauen gleichermaßen zu? In diesem Artikel prüfen wir anhand der PIAAC-Datensätze (Adult Skill Survey) für 13 europäische Länder, in welchem Maße die Kompetenzen von Männern und Frauen mit deren Positionen im Arbeitsmarkt korrelieren. In multivariaten Regressionen wird in der vorliegenden Untersuchung festgestellt, dass der Zusammenhang von Kompetenzen und Erfolg für Männer proportional verläuft, während dies für Frauen nicht der Fall ist. Ein Mehr an Fähigkeiten führt für sie keineswegs zu höheren Positionen oder Einkommen. Dies gilt sowohl für das monatliche Einkommen als auch für das Innehaben von Führungspositionen. Frauen haben im Schnitt höhere Kompetenzen als Männer bei ähnlicher Bezahlung und ähnlichen Positionen.

Schlüsselwörter
PIAAC, Grundkompetenzen, Geschlechterungerechtigkeit, Arbeitsmarktdiskriminierung, Einkommensungleichheit

Summary

This paper looks at men's and women's positions in the labour market and relates them to their basic skills. In a meritocratic society higher skills are supposed to relate to higher outcomes. We question whether this relation is equally true for men and women. Using data for 13 countries from the OECD Survey of Adult Skills (PIAAC), an international large-scale assessment, this paper examines monthly wages and a person's probability to be in a managerial position. Our analyses show that, on average, men with higher skills get higher wages and have a higher probability to be in a managerial position than women with equally high skills. We show that the relation between skills and outcomes is more proportional for men than for women and that the gender pay gap does apply to women and men with similar skills. In addition, the results highlight a gap in managerial positions between men and women with the same basic skills.

Keywords
PIAAC, basic skills, gender bias, labour market discrimination, income inequality

1 Introduction

Women and men in the workplace often face different challenges. Much has been written about phenomena such as the gender pay gap (e.g. Auspurg/Hinz/Sauer 2017; Goldan 2019; OECD 2017b), suggesting that the labour market provides different chances for men and women to have their skills acknowledged. However, the mechanisms underlying gender equity in the labour market are complex and subject to debate in numerous disciplines and worthy of further analysis. This paper aims to contribute to the extant literature by focusing on actual competencies, a factor which has received little attention in the literature. We examine the influence of basic skills on success in the labour market for men and women across a range of countries. In meritocratic societies as ours, skill is expected and claimed to be a determining factor for labour market outcomes. We challenge this assumption by analysing how basic skills relate to two key outcomes: monthly income and hierarchical position.

2 Gender

The labour market represents a key life situation in which people are confronted with specific gender-biased expectations. Examples of women who have rebelled against these expectations can be found everywhere and at various points in history. Women like Simone de Beauvoir are often regarded as the founding generation for a theorization of women, gender and later on queer studies (Babka/Posselt 2016: 31). It has become increasingly accepted that "being a woman" is a product of social power relations or social manipulations (Wittig 1992 [1981]: 246) rather than biologically or psychologically determined. Probably one of the most prominent elaborations of these thoughts was conducted by Judith Butler who claimed that not only social gender but also sexes are socially constructed as they are determined by power relations (Butler 1990). The way a system addresses people determines their social position (Butler 2013).

Mainstream labour markets tend to address people as one of two genders. To analyse potentially discriminating mechanisms we use the terms 'male' and 'female', not necessarily referring to gender identity but to the way people are being addressed by society and by a hegemonic discourse. When we talk of *women* in the workplace, we talk about those who are deemed female by their (workplace) environment.

The unequal positioning of men and women in the labour market is more complex than any single discriminatory mechanism. A multitude of different mechanisms are disadvantaging women. In the following sections, we will give a brief overview of research on specific moments of differentiation and gender-based exclusion in the labour market. These are, among others: (1) keeping women outside of the labour market, (2) the devaluation of women's labour, and – next to these structural, often invisible, discriminatory mechanisms – (3) women being faced with direct and indirect workplace discrimination.

2.1 Gaps in employment and division of labour

In meritocratic societies, one might expect that success in the labour market is awarded according to performance and proficiency. Regarding gender, a variety of mechanisms influence and determine economic outcomes. One explanation of different monthly incomes is the division of labour. Men are more likely to be in paid work and in full-time jobs (OECD 2017a). Even if both partners have paid jobs, a cross-national study showed how gender expectancies still influence the division of housework and disadvantage women (Aassve/Fuochi/Mencarini 2014). Polachek (2004) showed that married women with children earn less than married women without children and that married women who space their births widely apart receive even lower wages, compared to married men. This shows that it is not the number of children but the social construction of gender and parental roles which influence the worktime/pay distribution (Prietl 2015). The bigger economic dependencies and difficulties are, the more pronounced is gender inequality regarding division of household labour (Aassve/Fuochi/Mencarini 2014).

Such phenomena are not restricted to domestic labour: A qualitative British study by Theresa O'Keefe and Aline Courtois (2019) showed that women in academia often work in precarious situations and take care of the necessary reproductive work. This allows those in higher positions to further follow their own career paths without remunerating or acknowledging the women's labour and achievements.

2.2 Pay gaps, segregation and devaluation

Pay gap issues have been discussed by many scholars and advocacy groups (Auspurg/Hinz/Sauer 2017: 184f.). Gender employment gaps have been narrowing over the past decade (OECD 2017b: 142) but the gender pay gap among full-time workers has remained unchanged at just below 15 percent since 2010 and is especially large in favour of men among higher income earners (OECD 2017a). Similarly, women with a PhD benefit less from their high educational attainments in terms of income or their probability to be in a managerial position (Goldan 2019). Generally, men and women have different chances of being promoted in hierarchical structures. The *glass ceiling* is a term firstly introduced in the mid-1980s to describe an "invisible barrier for women and minority groups, preventing them from moving up the corporate ladder" (Weyer 2007: 483). This 'ceiling' might be based on different (gender) expectations, a gender bias in competence evaluation or the difficulty for women to combine a managing position with family life (Weyer 2007; Cotter et al. 2001).

In addition, more men than women seem to work in higher paid occupational fields of work (occupational segregation; Charles 2003). For example in Nicaragua, where women on average have higher educational attainments, gendered occupational segregation showed to be "an important phenomenon for understanding the persistence of income differences" (Herrera/Dijkstra/Ruben 2019: 21). Men working in predominantly female-oriented fields have significantly higher chances of being promoted and better paid (Dill/Price-Glynn/Rakovski 2016; Price-Glynn/Rakovski 2012). Women who work in highly segregated labour markets often experience even higher devaluation of their labour (Cohen/Huffman 2003).

2.3 Experiencing indirect and direct workplace discrimination

The effect of gender-normed expectancies goes beyond the division of labour at work. Some studies refer to workplace discrimination based on gender stereotypes, especially when the gender expectations do not correspond to the job expectations (Heilman/Parks-Stamm 2007: 49f.). Risse, Farrell and Fry (2018) suspect that assumed 'typically male' personality traits such as higher self-confidence, lower fear of failing or lesser need for agreeableness reinforce the pay gap since such properties are often understood as a proxy for actual competencies by employers. Studies on the gender status belief show that competencies or a person's suitability for authority are often presumed based on what status group a person belongs (or appears to belong) to (Ridgeway 2014).

A workplace culture in which competencies are assumed based on status and on stereotypically male behaviour might require high self-constraints of women in such male-normed leadership cultures (Dzubinski/Diehl/Taylor 2019). This makes it more difficult and less attractive for women to aim for a managerial position. On top of subtle discriminatory cultures, direct discrimination and sexual harassment are limiting women's labour market outcomes. Sexual harassment in the workplace is not only influencing women's work experiences but is also heavily affecting their early career trajectories. Personal experiences as well as the fear of harassment and a general misogynistic environment shape women's career plans; even criticising these "toxic work environments" can be detrimental for women's careers (McLaughlin/Uggen/Blackstone 2017).

In summary, women are often excluded from the labour market and from higher positions. Not only is work that is seen as *female* remunerated less, likewise the labour of women and the competencies attributed to women are less valued.

3 Basic skills

According to the Organization for Economic Cooperation and Development "[s]kills have become the global currency" (OECD 2012a: 6) for national economies as well as individuals in a 21st century world, i.e., skills have an increasing societal value.

3.1 Literacy and numeracy

For many decades, literacy has been considered as arguably the most fundamental basic skill, since it involves the ability to derive meaning from and communicate about printed texts which is essential for effective participation in society, including but not limited to the labour market. The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines literacy as "the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts" (UNESCO 2004: 13). The UNESCO view of literacy has subsumed quantitative skills as a subset of literacy. However, over the last three decades, numeracy has been increasingly recognized as a separate key basic skill. As with literacy, the term 'numeracy' has multiple meanings in professional discourse, ranging from some that emphasize basic computational skills to those that encompass a broad range of

skills, knowledge and dispositions associated with effective coping with the quantitative aspects of the world (Cockcroft 1982; Gal 1997).

In recent decades, multinational surveys of adult competencies have promoted the attention to literacy and numeracy as essential basic skills of adults. Such studies have provided comparative information about the distribution of basic skills of adults across many countries, and enabled better understanding of their social and economic correlates and outcomes. This paper uses data from the most recent comparative survey, OECD's Programme for International Assessment of Adult Competencies (PIAAC or the OECD Survey of Adult Skills). PIAAC enables the exploration of questions regarding the role of skills in the labour market and their interaction with gender in ways that have not been possible before (e.g. Martin 2018). The emphasis in this study is on actual skills, i.e., the ability to perform a range of functional tasks related to adults' lives as measured by (cognitive) tests, rather than on formal qualifications, since formal qualifications are just a proxy for actual skills and do not always reflect actual skill levels. Literacy has been defined in PIAAC as "understanding, evaluating, using and engaging with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential" (OECD 2012b: 20). Numeracy has been defined as the "ability to access, use, interpret and communicate mathematical information and ideas, in order to engage in and manage the mathematical demands of a range of situations in adult life" (OECD 2012b: 34). Real-life benefits in economic and social life and overall personal wellbeing are attributed to these skills (Grotlüschen et al. 2016: 10). Looking at numeracy skills, Jeffrey Craig (2018) determined three assumed *promises* of numeracy: numeracy skills of adults *promise* to empower those who command them, the skills' relevance for social participation is emphasized, all the while "personal, social, and cultural costs" (Craig 2018: 64) are seen as consequences of innumeracy. For the overall population, this relation can be confirmed, as multiple (secondary) analyses on adults' skills and outcomes show (e.g. Desjardins/Lee 2016). However, it is important to ask whether the economic benefits of literacy and numeracy apply equally for all parts of the population, including men and women alike.

3.2 Skill distribution

The different mechanisms discussed above show how labour market outcomes are not solely distributed by merit, but also seem to involve gender as a factor, even though skills (i.e., actual skills, not proxy variables) are supposed to be the decisive factor. In an ideal world, neither meeting gendered expectations nor assumptions about competences based on socialized behaviour would be part of one's labour market position. But what role do actual skills play? The examination of this issue has been quite difficult until the advent of comparative skill surveys of which PIAAC is the latest and most widely known example. We know that there is some degree of mismatching between skills that people hold and the skills required by their jobs (Flisi et al. 2017; OECD 2013a). An early analysis by Desjardins and Rubenson (2011), based on results from the Adult Literacy and Lifeskills (ALL) survey which preceded PIAAC, showed that skill mismatch is very much a gendered problem.

"Literacy and numeracy skill surpluses tend to be biased in favor of women, in some cases by a wide margin [...] there are generally more women than men in jobs that do not make full use of their literacy and numeracy skills. Conversely, there are more men than women in jobs that require a high level of engagement with literacy or numeracy practices – even if they have low levels of literacy and numeracy skills" (Desjardins/Rubenson 2011: 30).

Later results from PIAAC show that "in most countries there is no significant difference in literacy proficiency between men and women" (OECD 2016b: 81), whereas men score higher on the numeracy scale (OECD 2016b: 82). Christl and Köppl-Turyna (2017) examined skill use variables and skill mismatch in Austria's PIAAC data and found that they explain approximately four percent of the income variance. They were also able to show that the gender pay gap increases in higher income brackets and is especially prominent in bonus payments, but is smaller in lower wage groups. PIAAC also shows a wider gender gap in literacy and numeracy skills in older age (OECD 2016b: 82; Schmidt-Hertha 2014). The gender gap in numeracy has been seen as influenced by enculturated gender stereotypes (Nollenberger/Rodríguez-Planas/Sevilla 2016) and the readiness to confirm to expectations (Heilman/Parks-Stamm 2007: 49f.).

4 Research question and method

With the above background, this paper examines whether societal gender differences affect how key basic skills like literacy and numeracy result in real-life benefits in the labour market. This is not a new idea, Canadian politician Charlotte Whitton supposedly once said: "Whatever women do, they must do twice as well as men to be thought half as good." Looking at labour market outcomes, this would suggest that women are required to have higher skill proficiencies than men to attain the same positions or earnings. Therefore, our first research question is:

1) Do women need to have higher skills to gain the same wages and to be in a managerial position?

Based on a fundamental idea of equitable and impartial distribution of rewards according to skill and achievement, this would be highly problematic. Other gender biases in the labour market like work-time segregation or occupational segregation have been identified, but there is a lack of research on the different 'values' that skills might have for men and women when it comes to their labour market outcomes.

2) Do literacy or numeracy skills predict labour market outcomes (i.e., have the same predictive value) for men and women alike?

4.1 Data source and country selection

The PIAAC dataset is uniquely suited for answering our research questions, since it provides comparative information for multiple countries about literacy and numeracy skills, income, workplace status, educational attainment and other socio-economic variables. PIAAC is a study initiated by the OECD which focuses on OECD countries and is conducted every ten years. The present study draws on public use data files (OECD 2016a) from the first cycle of PIAAC, which in two assessment rounds overall included

33 countries. The results were published in 2013 and 2016 (Kirsch/Thorn 2013). The PIAAC design uses a household survey methodology addressing adults from 16 to 65 years. They answer a questionnaire and take direct assessments (cognitive tests) of literacy and numeracy skills. The survey has been administered in each country to a nationally representative sample with a minimum sample size of 5000 completed cases. More information about the PIAAC design, methodology, quality assurance procedures, and key findings are available in several OECD publications (e.g. OECD 2010, 2013a, 2013b, 2016b). The present study selected data for 13 PIAAC European countries to enable comparison of labour and economic outcomes for men and women working within economic markets with similar features. We had to disregard European countries whose PIAAC data did not disclose information on labour market positions or income. The 13 remaining countries were Belgium, Czech Republic, Denmark, Spain, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway and Poland. To minimize effects of possible confounders such as work-time segregation, we only examined the data of respondents who worked full-time (32 hours per week or more), i.e., excluded participants who are not employed, out of the workforce, or work part-time.

4.2 Variables and regression analyses

PIAAC scales its test items based on item response theory (IRT) to account for differences in item difficulties and to increase measurement accuracy (Yamamoto/Khorramdel/Davier 2013). The tests of literacy and numeracy skills were reported on a standardized scale from 0 to 500 points, which was then divided into five skill levels, plus a 'below level one' level. Table 1 shows the level boundaries in terms of the score points.

Table 1: Score boundaries in PIAAC

Level	Literacy/Numeracy score
below level 1	0–175
1	176–225
2	226–275
3	276–325
4	326–375
5	276–500

Source: Yamamoto/Khorramdel/Davier (2013).

Gender is reported in a binary way (male/female) in OECD studies, as well as in national level labour force surveys conducted in many countries. In PIAAC, gender was "recorded by the interviewer through observation" (OECD 2010: 7) and only asked when the interviewer was uncertain. Although this does not correspond to our understanding of gender identity, we can assume that this phenotype-based variable corresponds quite well to actual labour market mechanisms and skill distribution. We assume outcomes to be distributed according to interpreted social gender and gendered expectations instead of actual gender identity. Income is given in the data in the form of monthly

wages, specified in US dollars at purchase power parity (ppp) so all country-related results can be interpreted on the same scale. Both variables include employees as well as self-employed workers. Since levels of income often vary between different fields and types of work, we also examined as a second outcome variable the hierarchical positioning (being in a managerial role) to reflect success in the labour market. Self-reports on whether participants have employees or manage other employees were recoded into a binary variable. To analyse effects on income we use multinomial regression analyses. For the managerial positions logistic regressions were used. For both outcome variables two regression models were conducted. Model 1 looked solely at the interaction term of gender and literacy/numeracy, while model 2 looked at the effects of gender and literacy/numeracy when controlling for age, educational attainment, parental educational background, native language, different fields of work and the average hours of work per week. This approach enabled us to control for the cumulative impact of multiple background variables.

5 Findings

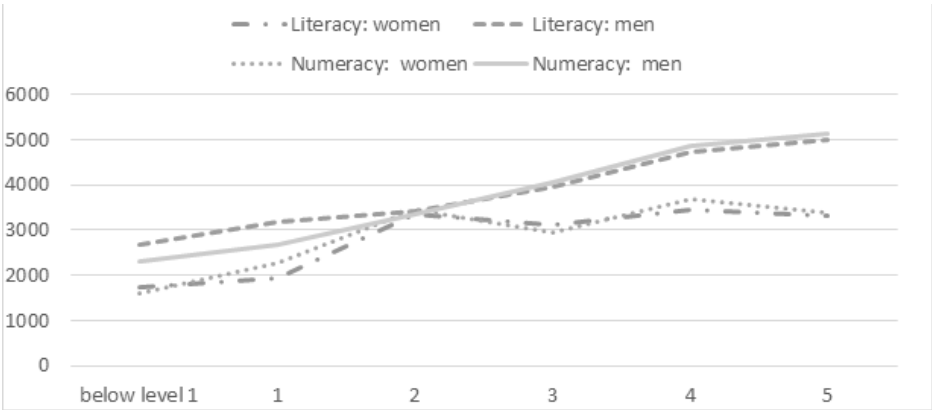
In the following, we first present descriptive findings on the averages of the two outcome variables, income and managerial positions for women and men at different skill levels. Then we examine the 'value' that high skills have for men and women in terms of the two outcomes and compare similar skilled women and men in this regard.

5.1 Descriptive findings

The average literacy scores in our sample are 268.8 for women and 270.8 for men. On numeracy, women score an average of 265.5 and men of 273.1 points. While the difference in literacy is not significant, the numeracy gap is highly significant on a level below 0.001[2]. First, we look at the average income of men and women at different skill levels, shown in figure 1. With the exception of level 2, the incomes of men are higher than those of women. There is a significant gap between women's and men's average incomes. European men at the highest skill level earn on average $5,000, while full-time working women at the same skill level earn about $3,400 i.e., marginally below the average for level-4 men, which is $3,600.

2 In an f-test based on the estimation of standard errors by the R-packages survey (weighted means) and mitml (degrees of freedom).

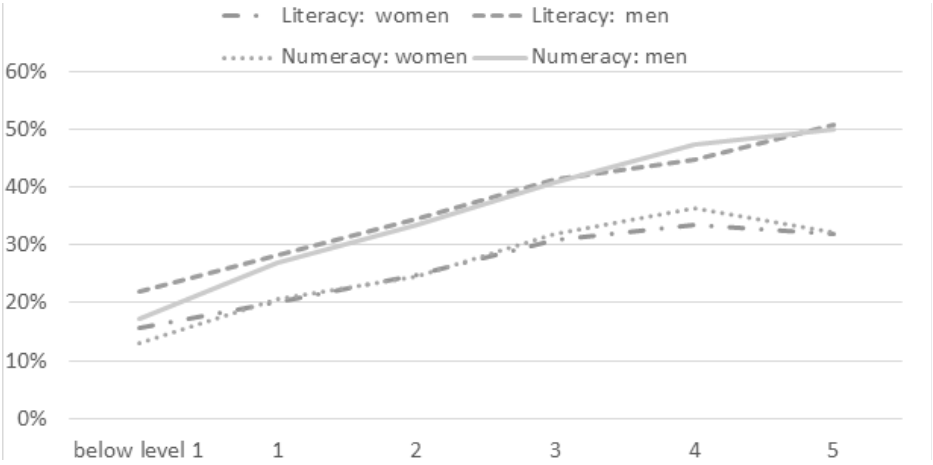
Figure 1: Average income of full-time working men and women in each literacy/numeracy level



Notes: Income in US dollar and under ppp by PIAAC skill levels.
Source: own figure.

The table shows similar results for the percentages of persons who are managing employees (figure 2). Again, the curves differ mainly between the genders and less between the skill levels. The higher the level, the higher the proportion of those in a managerial position. Only for women does the proportion drop from level 4 to level 5, from 36/34 percent (for literacy/numeracy) to 32 percent. For men, the percentage of those in a managerial position rises from 45/47 percent (literacy/ numeracy) to over 50 percent at level 5. It is also noticeable that at level 4 numeracy skills seem to relate to slightly higher percentages than level-4 literacy.

Figure 2: Percentage of full-time working women and men in each literacy/numeracy level in a managerial position



Notes: Income in US dollar and under ppp by PIAAC skill level.
Source: own figure.

Both examples confirm the general and well-known trend that higher skills relate to higher labour market outcomes. They also show that men's average income and their share in managing positions are higher for each skill level and that the proportionality is more consistent for men than for women.

5.2 'Value' of skills for monthly income

A regression analysis against the interaction term of gender and skill shows the effect of skills on monthly wages. Ten literacy points equal an average of $89 for women but $113 for men. Ten numeracy points equal an average of $98 for women but $121 for men. Table 2 presents the country-wise differences which show variation around these average figures.

Table 2: Averaged income equivalents of ten literacy/numeracy points in US dollar for full-time working women and men

	Income equivalent of ten literacy points						*Income equivalent of ten numeracy points*					
	for women			for men			for women			for men		
Belgium	101	(21.7)	***	144	(23.6)	***	98	(25.8)	***	135	(25.4)	***
Czech Rep.	40	(19.4)	*	68	(21.4)	**	28	(24.9)		55	(24.4)	*
Denmark	-686	(867.8)		-548	(775.3)		-220	(410.7)		-64	(309.5)	
Finland	53	(7.9)	***	77	(8)	***	70	(7.7)	***	91	(7.4)	***
France	57	(13.6)	***	76	(13.5)	***	73	(10.8)	***	89	(10.3)	***
Germany	153	(12.9)	***	188	(13.5)	***	164	(14)	***	193	(14.1)	***
Greece	48	(12.3)	***	60	(13.3)	***	50	(11.3)	***	61	(12.2)	***
Ireland	169	(20.3)	***	202	(23.3)	***	163	(22.5)	***	191	(21.9)	***
Italy	50	(20.1)	*	75	(20.3)	***	54	(19.5)	**	76	(19.1)	***
Netherlands	-349	(320.8)		-270	(298.5)		-265	(288.5)		-173	(250.4)	
Norway	111	(13.8)	***	149	(14.2)	***	113	(13)	***	146	(12.8)	***
Poland	97	(50.4)		136	(75.8)		96	(64.6)		132	(84)	
Spain	243	(201.3)		155	(109.5)		146	(115.7)		66	(136.5)	

Notes: Standard Error (SE) in parentheses; significances: *** ($p < .005$), ** ($p < .01$), * ($p < .05$).
Source: own figure.

Table 2 shows, for example, that in Germany ten numeracy points predict an average higher income of $193 for men but only $164 for women. In all countries, men seem to get higher increases both for their numeracy and literacy proficiency. Proportionally, the women's increase lies between 60 and 85 percent of the men's. The differences between men's and women's increase is statistically significant in Finland, Germany (only for literacy) and Norway, but not for Denmark, the Netherlands, Poland and Spain.

5.3 Same skills – different income

In a second model, we made a regression analysis of the monthly income against gender, skill and the background variables. Table 3 shows the effect of being male on monthly wages.

Table 3: Effect of male gender on monthly income for full-time workers

	with equal literacy			with equal numeracy		
Belgium	1008	(202.1)	***	977	(198.9)	***
Czech Republic	757	(290.1)	**	756	(288)	**
Denmark	217	(650.5)		-326	(1089)	
Finland	701	(57.1)	***	664	(57.6)	***
France	396	(80.5)	***	385	(79.7)	***
Germany	747	(149.5)	***	686	(146.7)	***
Greece	408	(88.5)	***	395	(87.9)	***
Ireland	968	(242.7)	***	905	(249.6)	***
Italy	715	(137.7)	***	703	(139.7)	***
Netherlands	1010	(789.3)		934	(686.9)	
Norway	1054	(101.6)	***	994	(104.5)	***
Poland	344	(288.9)		240	(263.2)	
Spain	-5276	(7051.4)		-5060	(6698.1)	

Notes: Coefficients of regression analysis of male gender on monthly income in US dollar under ppp when controlled for literacy/numeracy skills and background variables; SE in parenthesis; significances: *** ($p < .005$), ** ($p < .01$), * ($p < .05$); controlled for age, educational attainment, parental educational background, native language, different fields of work and the average hours of work per week.
Source: own figure.

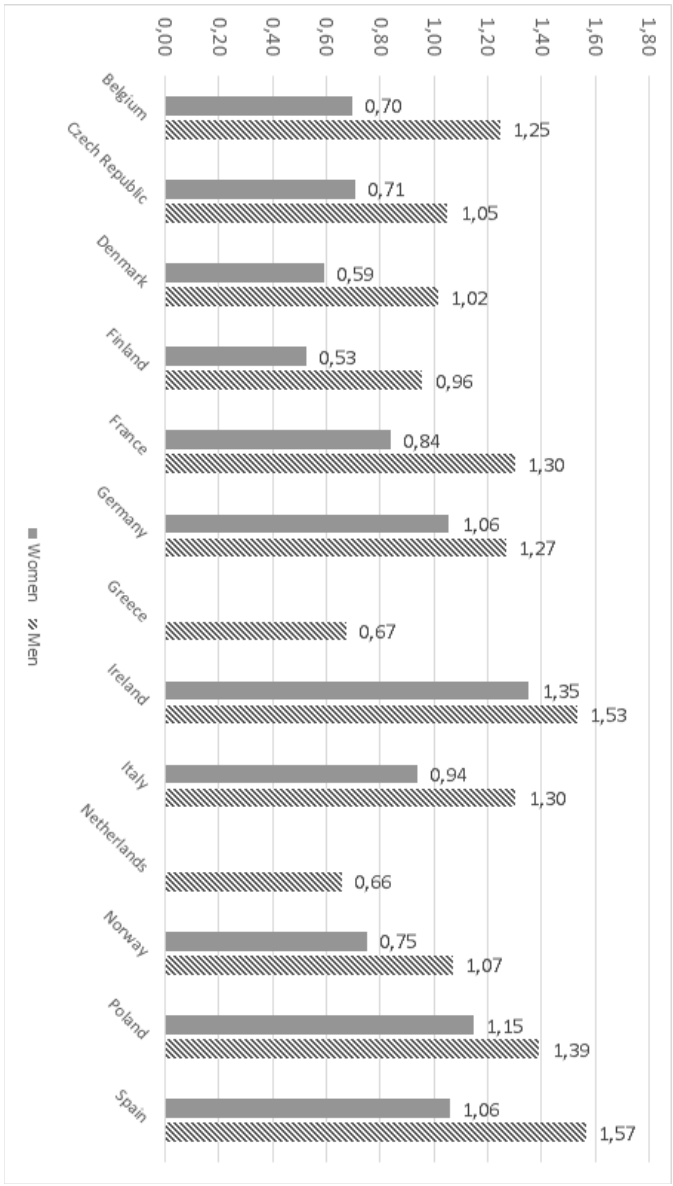
Table 3 shows that men in the 13 examined countries earn around $700 more than women with the same literacy or numeracy skills. The effect of male gender is lowest in France and Greece and highest in Norway, Belgium, and Ireland. Most effects lie between $400 and $1000. Again, there are no significant results in Denmark, the Netherlands, Poland and Spain. The significant coefficients for single literacy or numeracy points range between two and eight. This means that the gender effect is between 70 and up to 200 times the literacy or numeracy effect.

5.4 'Value' of skills for managerial positions

Regarding the managerial positions, we performed a binominal logistic regression with the interaction term of gender and literacy/numeracy. All the results presented are given as odds ratios. A first joint analysis of the 13 countries showed that ten literacy points increase the chance of a woman to be in a managing position by 0.9 percent. The same ten points increase the chance of a man by 1.3 percent. Figures 3 and 4 demonstrate the country-wise increase in one's probability to get a managerial position. In Germany, for

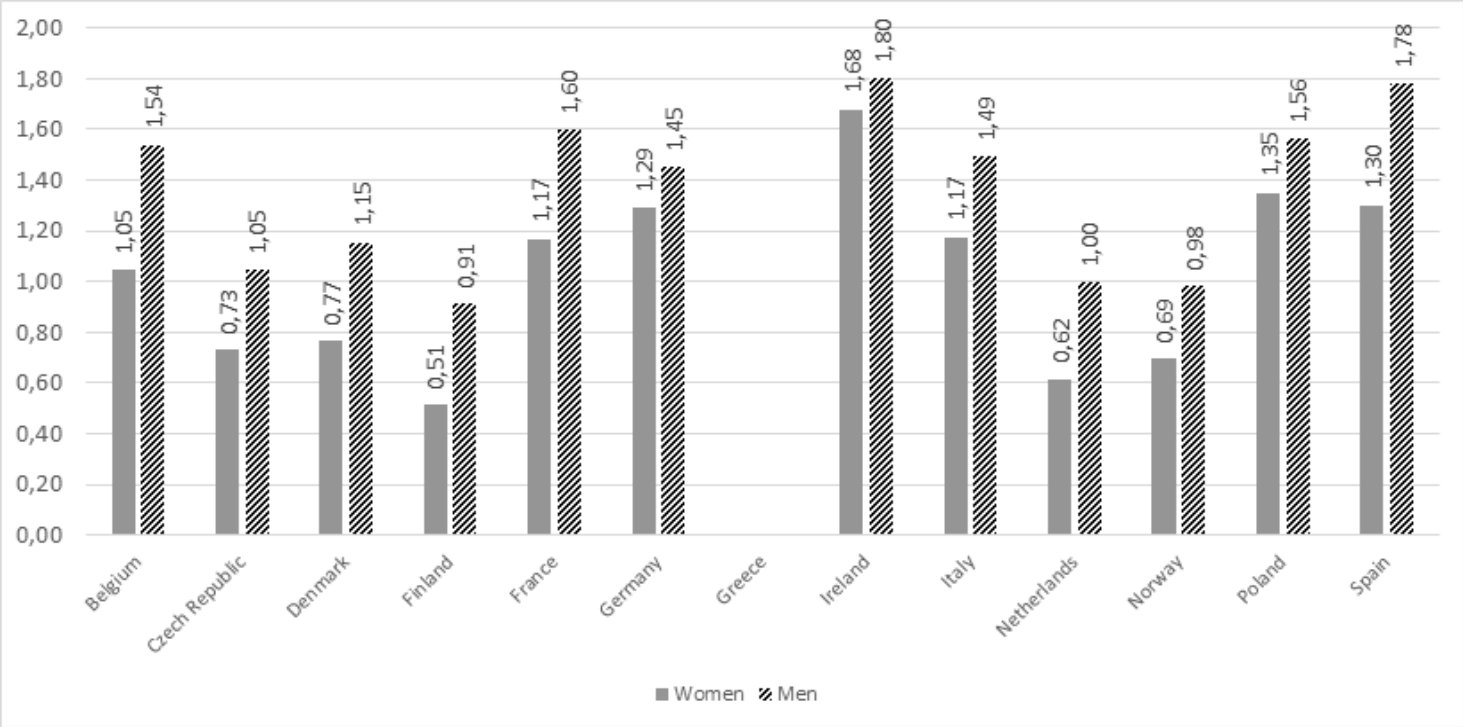
example, ten additional literacy points predict an increase in probability of 1.1 percent for women and 1.3 percent for men. Greater differences can be found for Belgium (0.7 to 1.2), Spain (1.1 to 1.6), or France (0.8 to 1.3). Figure 4 displays the same results for numeracy. The smallest difference between men and women can be found in Ireland with an increase of 1.7 percent for women and 1.8 percent for men, followed by Germany with increases of 1.3 and 1.5 percent. The biggest differences between women and men can again be found in Belgium, Spain and France in terms of the probability to be in a managerial position.

Figure 3: Average increase in the probability to be in a managerial position with every ten additional literacy points for full-time working women and men



Notes: Odds ratios of a logistic regression on the interaction term of literacy and gender displaying the average increase of probability to be in a managing position; only coefficients with $p < .05$ are displayed.
Source: own figure.

Figure 4: Average increase in the probability to be in a managerial position with every ten additional numeracy points for full-time working women and men



Notes: Odds ratios of a logistic regression on the interaction term of numeracy and gender displaying the average increase of probability to be in a managing position; only results with $p < .05$ are displayed.
Source: own figure.

5.5 Same skills – different positions

Table 4 shows how much more likely men are to be in a managing position, comparing men and women with the same literacy/numeracy skills, the same educational attainment and background, the same working hours per week, in the same field of work, in the same age group, and with a similar language background. On average across all 13 countries, males have a 9.8 percent higher probability to be in a managing position. There are no significant results in Germany, Greece and Ireland. The effect of gender is highest in Spain and the Czech Republic, were same skilled men show an about 14 percent higher probability to be in a managing position. In Finland, Belgium, Italy, and France men with the same literacy or numeracy skills are nine to 13 percent more likely to be in a managing position. The lowest significant difference can be found in Denmark and Finland, where men are between five and six percent more likely to either have or manage employees.

Table 4: Probability to be in a managerial position for male gender when controlled for literacy/numeracy skill and background variables compared to persons with female gender

	Literacy			Numeracy		
Belgium	1.105	(1.021)	***	1.097	(1.021)	***
Czech Republic	1.139	(1.025)	***	1.138	(1.025)	***
Denmark	1.063	(1.015)	***	1.059	(1.015)	***
Spain	1.147	(1.018)	***	1.127	(1.018)	***
Finland	1.126	(1.017)	***	1.094	(1.017)	***
France	1.098	(1.022)	***	1.019	(1.022)	
Germany	1.023	(1.026)		1.031	(1.026)	
Greece	1.032	(1.024)		1.004	(1.024)	
Ireland	1.014	(1.024)		1.092	(1.024)	***
Italy	1.101	(1.024)	***	1.071	(1.025)	**
Netherlands	1.072	(1.021)	**	1.050	(1.021)	*
Norway	1.054	(1.02)	*	1.088	(1.02)	***
Poland	1.089	(1.022)	***	1.138	(1.022)	***

Notes: Odds ratios of logistic regression analysis of male gender; exponent of SE in parenthesis; significances: *** ($p < .005$), ** ($p < .01$), * ($p < .05$); controlled for age, educational attainment, parental educational background, native language, different fields of work and the average hours of work per week.
Source: own figure.

6 Discussion

The present study aims to contribute to the existing literature about women's places in the workforce. The study focuses on examining how skill levels, when measured directly (not via proxy variables as in most studies in this area), affect the income levels and the position, even after controlling for multiple factors. The key findings can be summarized in relation to three issues.

6.1 Male gender makes up for at least 70 skill points

The results reaffirm the presence of a gender pay gap and a gendered gap in managerial positions. Men have a higher income than women with the same skill level and conversely, women have higher skill levels than men with the same income, even after controlling for age, educational attainment, parental educational background, native language, different fields of work and the average hours of work per week. It would – statistically speaking – take a woman between 70 and 200 additional skill points (on a 0 to 500 scale) to 'make up' for not being male; or, if one flips this statement, men who earn the same as a women score on average 70 to 200 points lower on the same scale. Men seem to earn a monthly salary that is on average $700 higher than the salary of women with the same skill proficiency. Similarly to Michael Christl and Monika Köppl-Turyna (2017), we found that skills play an important role in determining gender wage gaps. However, we did not look at skills to explain general wage differences but aimed to determine the unequal effect of skills for men and women at different skill levels. While on average higher skills predict higher income and thus explain income variance, we show that the economic benefit that men and women gain from their skills is vastly unequal.

Men are on average ten percent more likely to be in a managerial position than women with the same basic skills. Many studies have documented that men are generally more often in managerial positions, but here we show that men are also more likely to be in such a position than women with equal basic skills. Mechanisms that lead to this distribution have already been described both in qualitative (Dzubinski/Diehl/Taylor 2019; Baumgartner/Schneider 2010) and quantitative (Risse/Farrell/Fry 2018) research. All studies share the idea that labour market outcomes are (partially) distributed by male-normed expectations. In the workplace, certain behaviours may be interpreted as signs of high skills and awarded as such. Our findings indicate that skills might be acknowledged differently for different genders.

6.2 Proportional for men – disproportional for women

In a meritocratic labour market, we would expect linearity between skill level and outcomes, yet the results show that this only holds true for men. These findings add to Desjardins' and Rubenson's (2011) findings on skill surpluses by showing the direct impact of skill mismatches in terms of monthly income and managerial position. The men's curves for income and position correspond to the meritocratic idea of higher skills leading to higher outcomes. The women's curves, however, are constantly below the men's curves which reaffirms the persisting 'glass ceiling effect' (cf. Weyer 2007).

There are several possible interpretations for this set of findings. Women might not make full use of their skills in their work, or some men might be in positions that require higher skill levels than they actually have. Because higher skilled women do not get into the responding higher income brackets to an equal amount, women show higher skill averages than equally paid men do.

6.3 Limitations

Results that are based on comparative large scale surveys such as PIAAC have some limitations and should be interpreted with caution, due to known features of the methodology used in such surveys (e.g., they are population estimates and do not enable individual comparisons). Furthermore, the results are cross-sectional and only offer a snapshot of the situation during 2011 and 2012 when PIAAC data were collected, hence they cannot provide a historical perspective which is essential for understanding societal changes regarding women in the workforce (Dilli/Carmichael/Rijpma 2019). Since PIAAC is designed on a ten-year interval, it would be important to repeat this analysis after the next wave of PIAAC data are released in 2023, and then compare countries with more diverse types of economies and social systems. Furthermore, skill assessments do not exist outside of social power relations. The tested skills are reflective of societal expectations (cf. Street 1993). Large-scale assessments like PISA or PIAAC presuppose a certain cultural unity and reproduce their presumptions (Guadalupe 2015). This, however, does not disqualify the use of PIAAC data. The assessed skills are embedded in social structures and social practices, as Steven Reder (2017) conceptualized, and we can assume that they reliably recreate those social structures that influence labour markets and that we try to analyse.

While we were able to control our regression analyses for a person's age, PIAAC data does not include a variable for the years a person has worked in their respective fields. Different years of professional experience might explain a part of our findings, as for example the length of a women's absence from work (e.g. to care for children) may result in un-proportionally lesser wages (e.g. Polachek 2004).

Regarding the country differences, our calculations do not allow for a substantial comparison of the countries. The tables show the values for the respective countries but should not be interpreted as any kind of benchmark. Because we displayed the values as US dollars under purchase power parity, the amounts would have to be contextualised with each county's general purchase power, economic situation, and average (gender) income disparity in the population. In addition, because we only included those who are working full-time, the differences in the sample sizes of men and women differed greatly. Further country-wise analyses would be needed to explain the country differences.

7 Conclusion

In closing, it is important to state that as skills are becoming a global currency of the 21st century (OECD 2012a: 6), we can no longer afford not to acknowledge basic skills and basic competencies in studies focused on women's place and behaviour in

the labour market. The present analysis suggests that labour markets in several European countries seem to disregard actual skill levels of women, presumably in favour of gendered expectations of skill and workplace behaviour (cf. Heilman/Parks-Stamm 2007; Dzubinski/Diehl/Taylor 2019; Risse/Farrell/Fry 2018). We see that women earn less than equally skilled men, that men show lower skill averages than women with equal pay or in an equal position and that higher skills mainly lead to higher outcomes for men. Thinking further, the analysis of gendered skill acknowledgment might also impact those who are unemployed and trying to re-enter the workforce (e.g., Arrazola/de Hevia 2016), or work unpaid. Hence, it would be important to examine how actual skill levels of women contribute to unemployment, layoffs, and job market re-entry. Future research that will include variables reflecting actual skill levels and not only proxy variables may be able to expand our understanding regarding whether the neoliberal idea of 'better outcomes for higher skills' does hold true for women in the same way it is applicable for men.

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