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Equal Pay for (Un)Equal Education? A Cross-Country Comparison of the Gender Earnings Gap & Inequality

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Equal Pay for (Un)Equal Education? A Cross-Country Comparison of the Gender Earnings Gap & Inequality

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Abstract

This paper compares labor earnings at different education levels, specifically as it pertains to the gender earnings gap and overall inequality in 18 high-income countries for working-age, employed adults. It introduces a novel descriptive statistic to show the “staggered education gender gap” (StEGG), which is a comparison of hours-adjusted median earnings when women have the advantage in educational attainment compared to men. Regression analysis with an interaction between gender and education level, which includes all prime-age workers (part-time and full-time), reveals that there is a negative gender effect for women compared to men at both the medium and high education levels for all countries included. On the other hand, the education effect, in some cases, favors women with high education. The gender effect and the education effect have statistically significant relationships with various measures of overall earnings inequality.

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Introduction

As women outpace men in educational attainment worldwide, the persistence of the gender earnings gap confounds neo-classical economic human capital models (Gornick, 1999). The female education advantage only seems to be widening (OECD, 2023) and its heterogeneous effects in countries with different labor markets and institutional structures impels further analysis. There is a vast literature on the expansion of higher education and its effects on labor market outcomes (e.g., Acemoglu & Autor, 2011), earnings inequality within countries (e.g., Gottschalk & Joyce, 1998), and the gender-wage gap (e.g., Goldin, 2014). There is also a growing literature on declining premiums to higher education and gaps in earnings between those with or without a university degree (e.g., Bar-Haim et al., 2019).

Much recent research on education and labor market outcomes has looked at this very binary in educational attainment: those without a bachelor's degree, and those with a bachelor's degree or more. While this type of research is valuable, it leaves out considerable variation when we consider countries with different institutional arrangements (Pfeffer, 2008) and education-to-work linkages (DiPrete et al., 2017). Moreover, studies that only consider full-time workers run the risk of excluding those that engage in "women's work," which is often part-time work (Bardasi & Gornick, 2008).

Using Luxembourg Income Study (LIS) data from 18 high-income countries, this paper considers the labor earnings of employed workers of prime working age (25-54) with low (less than upper secondary school), medium (secondary or post-secondary school), and high (tertiary or above) educational attainment. The large sample and three-pronged approach to analyzing education returns, gender disparities, and overall earnings

inequality provides a more nuanced and comprehensive approach to getting at the relationship between educational systems, institutions, and earnings gaps. The implications go beyond gender disparities and measures of inequality, and may ultimately affect class divisions, political discontent, and voting behaviors (Ansell & Gingrich 2017).

Three main questions are considered. First, how do labor market earnings vary by education? Second, what is the effect of gender on earnings by education and the effect of education by gender? To get at these questions, each are considered by between and within group differences. In other words, this study looks at what individuals are earning in the labor market at different education levels compared to those of the same gender, and it also looks at the potential disparities in labor market earnings by gender at various education levels. Third and finally, what is the relation between educational earnings disparities and earnings inequality? The answers to these questions are primarily compared between countries, but this analysis also notes trends among country clusters (Esping-Andersen, 1990).

The results indicate that the gender earnings gap persists, though it varies considerably by country. In all cases, for men and women, those with high education earn more than those of the same sex with medium education. In most countries, men with medium attainment earn more than men with low attainment. However, this holds in less than half of countries for women. When women with an educational advantage are compared to men, hours-adjusted median earnings are not necessarily higher for women with more educational attainment than men, especially at the medium (secondary or post-secondary) level.

There is a negative gender effect for women compared to men at both the medium and high education levels for all countries included. On the other hand, the education effect, in some cases, favors women with high education. There is a statistically significant relationship between the gender effect at medium education and overall p90/p10 and p50/p10 earnings inequality. There is also a statistically significant relationship between the education effect at high education and overall p90/p10 and p50/p10 earnings inequality, but the direction is reversed. This suggests that in countries where the effects of tertiary education favors women, overall earnings inequality is lower at the bottom-half of the distribution and when comparing the top to the bottom. It also suggests that at the medium education level, the effect of gender is not positively correlated with overall earnings inequality. It is, instead, reversed. Countries that have lower gender effects actually have higher overall earnings inequality.

Literature

Educational Attainment and Earnings

Since the 1970's educational enrollment has skyrocketed (Ansell & Gingrich, 2017), especially in higher education, and in the ensuing decades women have outpaced men in enrollment (Marginson, 2016). Across the OECD, young (25-34) women are more likely to have tertiary education than men, at a rate of 54 percent of women to 41 percent of men (OECD, 2023).

Returns on education (i.e. earnings) have not kept pace with increased enrollment. In high-income countries, the absolute returns to higher education have lessened over time (Bar-Haim et al., 2019). However, returns on tertiary education remain strong in high-

income countries such as the United States, France, and in Germany, if only modestly. Eyal Bar-Haim and colleagues (2019) find that *relative* returns have increased because premiums for lower education levels have decreased, suggesting a widening of earnings inequality. In some countries, returns are still strong. For instance, more than a quarter of adults in Germany and Ireland with a bachelor's that worked either full or part-time earned more than twice the median in 2021. On the other hand, this group was less than 10 percent in the Nordic countries. Those with short-cycle tertiary education generally earned less, though Slovak Republic, Greece, Austria, Norway, and Denmark (among others) are exceptions (OECD, 2023: 97).

Education credentials do not operate uniformly; the type of credential and the structure of the labor market matters (Ansell & Gingrich, 2017; Bol et al., 2019). Countries such as Germany, Switzerland, and the Netherlands have strong vocational education and training (VET) systems, whereas the US has massively expanded access to higher education. On the one hand, higher education can contribute to higher earnings, but can also lead to large accumulations of student debt. VET systems have been criticized for their limitations on intergenerational mobility (Pfeffer, 2008) but can have positive impacts on youths with alternative skill sets (Bol et al., 2019; Busemeyer, 2017}. The United States has the lowest levels of 25–34-year-olds that have vocational training as their highest level of education among high-income OECD countries (less than 5 percent), while that figure is about 50 percent for Slovak Republic and Austria, the highest among OECD countries (OECD, 2023: 39).

These differences in credentialism and labor market “matching” are highly dependent on a country’s institutional structure. Ben Ansell & Jane Gingrich (2017) identify wage compression and professional “protectionism” as institutional factors that determine whether increased higher education attainment is associated with favorable labor market outcomes. Countries with large public sectors tend to have more wage compression, such as the Nordic countries, where wage compression contributes to lower earnings for higher education, but does not contribute to the “skill mismatch,” that occurs in some southern European countries with protected professions (Ansell & Gingrich, 2017). Silja Häusermann & Hanna Schwander (2012) argue that institutional arrangements in continental and southern European welfare states exacerbate “labor market dualism,” contrary to liberal welfare states, such as the United States, that tend to provide more opportunities for increasing earnings through education.

Gender Earnings Disparities and Labor Markets

Blau & Kahn (1992) highlight two processes in intercountry comparison: 1.) gender specific differences like education and (un)equal treatment of these qualifications and 2.) the way that various skills are valued in different labor markets. In the United States, higher levels of wage inequality increase the gender disparity compared to other countries because the US labor market penalizes less-skilled workers. On the other hand, countries with strong union membership and/or greater wage compression will have smaller disparities. Elizabeth Brainerd (2000) shows that during the post-Soviet transition, in countries that took extreme measures to reform their labor markets like Russia and Ukraine, the gender wage gap increased, which was not the case in other Eastern European

countries that were not so radical in policy change and maintained higher levels of female labor market participation and more modest gender wage gaps.

Elissa Braunstein & Stephanie Seguino (2018) suggest that gender inequality and earnings inequality should be considered separately because income is not always shared at the household level. Partnered women in Spain and Italy experience high levels of gender earnings inequality, and in the US, employment of partnered women is relatively high, but earnings are still very unequal (Harkness, 2013). In a 2017 study, Blau & Kahn found that in the US, wages between men and women converged most in the 1980's. They also found a diminished role of education in reducing the gender wage gap over time.

Cross-national research, especially using the LIS data, has often used Esping-Andersen's *Three Worlds of Welfare Capitalism* approach to classifying modern welfare states as social democratic, conservative welfare states, and liberal welfare states, though studies on education have often been left out of this literature (Willemse & De beer, 2012). I will follow John Gal (2010) and consider the Mediterranean welfare states as another category.

The feminist critique of *Three Worlds* is particularly relevant to the present study. Central to Esping-Andersen's (1990) conception of the modern welfare state is that they aid in decommodification of citizens – that is, they protect the worker from being subject to unimpeded market forces. Feminist critiques have pointed out that this underplays (or even disregards) the role of care work that women do, which has never been commodified in the first place. Instead, this argument asserts, notions of citizenship on which these conceptions are based largely refer to the male worker that T.H. Marshall (1951) envisioned in his foundational work on the development of citizenship rights in Britain (Gornick, 1999; J.S. O'Connor, 1993; Orloff, 1993, 1996). Much like research on education and returns in the

labor market, research on the gender wage gap often points to the structure of the labor market and cultural norms. High levels of female participation in the labor force, like in the Nordic countries, may mask other problems, like segregated occupational structure or reliance on part-time work. Not all groups are equally commodified, so de-commodification will not be carried out equally (J.S. OConnor, 1993).

Inequality

In 1997 Dennis Sullivan & Timothy Smeeding used Mincer (1974) earnings regressions to calculate differentials in logged labor earnings by educational attainment. They found that the rewards associated with educational attainment were not uniform and that different labor markets, job matching programs, and other institutional arrangements were important. However, there is not always a direct connection between inequality and education premiums (Bussemeyer2017). Peter Gottschalk & Mary Joyce (1998) note the diminishing returns on a high school education at the end of the 20th century for men in high-income countries. However, they find little correspondence between the educational premium and increased inequality for countries besides the US and UK, which both have relatively decentralized labor markets. In Western Germany towards the end of the 20th century, inequality had not increased, but compared to the US – which experienced significant increases in inequality – there was a smaller supply of highly educated workers (Abraham & Houseman, 2019). Thus, educational attainment varies by country and the earnings associated with that attainment varies based on the institutional arrangements of a given country.

Sullivan & Smeeding (1997) did not examine the gender earnings gap, while Blau & Khan (1992, 2007) focused on the United States in comparison with a relatively small sample of countries. Feminist critiques (Gornick, 1999; OConnor, 1993; Orloff 1993, 1996) of the Esping-Andersen's (1997) *Three Worlds of Welfare Capitalism* paradigm have examined various aspects of the welfare-state in cross-national context, but there has been little attention paid to human capital (education), gender earnings disparities, and overall earnings inequalities with a large sample of countries (Bar-Haim et al., 2022 look at this problem focusing on higher education and the gender disparity only).

Data & Methods

This analysis uses micro-data from the Luxembourg Income Study (LIS), which includes high-quality and easily comparable data (Atkinson, 2004) for Australia, Ireland, the United Kingdom, the United States, Austria, Germany, Luxembourg, Netherlands, Greece, Spain, Denmark, Finland, Sweden, Czech Republic, Estonia, Lithuania, and Slovak Republic from 2016 and Hungary from 2015. The dependent variable is labor market income (pilabour). In regression the logit-rank of pilabour is used, which allows the inclusion of part-time workers or zero-earners (Chauvel, 2014, 2016) so we can see the fuller extent of the gender earnings gap (Bardasi & Gornick, 2008).

The two main variables of interest are educational attainment (educ), which is a three-category standardized variable that corresponds with UNESCO's 2011 International Standard Classification of Education (2012), and gender (sex). "Low" education is ISCED 2011 levels 0,1, or 2, which corresponds with not attending or completing upper-secondary school. "Medium" education denotes completion of upper-secondary school or post-

secondary nontertiary education (ISCED 2011 levels 3 or 4). "High" education denotes completion of tertiary education (ISCED levels 5 to 8), such as a university degree. Gender is defined as identifying as Male or Female. The entire sample is limited to employed, prime working-age (25-54) adults. Control variables in this analysis include age, age squared, employed (emp), a nine-category occupational variable (occb1)², industry (inda1), whether the respondent lives with a partner (partner), whether the respondent has children under 18 living with them (a dummy variable made from the nchildren variable), and whether the respondent worked full-time (fyft when available, or simply the hourtot variable).

The "staggered education gender gap" (StEGG) shows the hours-adjusted median income (total earnings divided by hours worked per week) of women with 1.) medium education compared to men with low education and 2.) high education compared to men with medium education for each country. I use ordinary least squares regression to get at the main research questions. The first question, *how do labor market earnings differ by education?*, will be considered disaggregated by gender in the first model, and then with men and women together in the second model, with an interaction for education and gender. When disaggregated by gender, the differential in earnings will simply be the difference in the logit-rank labor income coefficients at low compared to medium and medium compared to high education. In the second case, I convert the coefficients from the interaction to predicted values to show the predicted income at each education level by gender. Essentially, this means that we are observing the effects - the difference in slopes - of the two predicted values, which allows us to look at the second question, *what is the*

² The Australian data only allows for a three-category occupation coding.

effect of gender on labor market earnings? Because the interaction is symmetrical, I also consider the effect of education moderated by gender (the education effect). Finally, to consider the third question, *what is the relation to educational earnings disparities and overall earnings inequality?*, I test the relationship between education differentials and p90/p50, p90/p10, and p50/p10 earnings inequality 1.) disaggregated by gender, and 2.) with men and women together in scatter plots and test for correlation.

Finally, beyond analyzing these various relationships and effects at the country level, I cluster the countries following the scholarship surrounding Esping-Andersen (1990) into five categories: Anglo, Continental, Mediterranean, Nordic, and Former Socialist. The Anglo countries are Australia, Ireland, UK, and the US. The Continental countries are Austria, Germany, Luxembourg, and Netherlands. Spain and Greece are the Mediterranean countries. The Nordic countries are Denmark, Finland, and Sweden, and the Former Socialist countries are Czech Republic, Estonia, Hungary, Lithuania, and Slovak Republic.

Findings

This section will proceed through descriptive statistics to provide background before moving on to regression results. Figure 1 shows the distribution of educational attainment disaggregated by gender. It shows that there is considerable variation by country and within countries by gender. For example, Slovak Republic has the smallest proportion of its employed working-age population that has only low education. On the other hand, Spain, Luxembourg, and the UK all have relatively high proportions of men with low education. In every country in this study, with the exception of Germany, a larger proportion of women have high educational attainment compared to men. Medium

education is the most prevalent, for both men and women, in Austria, Czech Republic, and Slovak Republic.

Figure 1. Educational Attainment

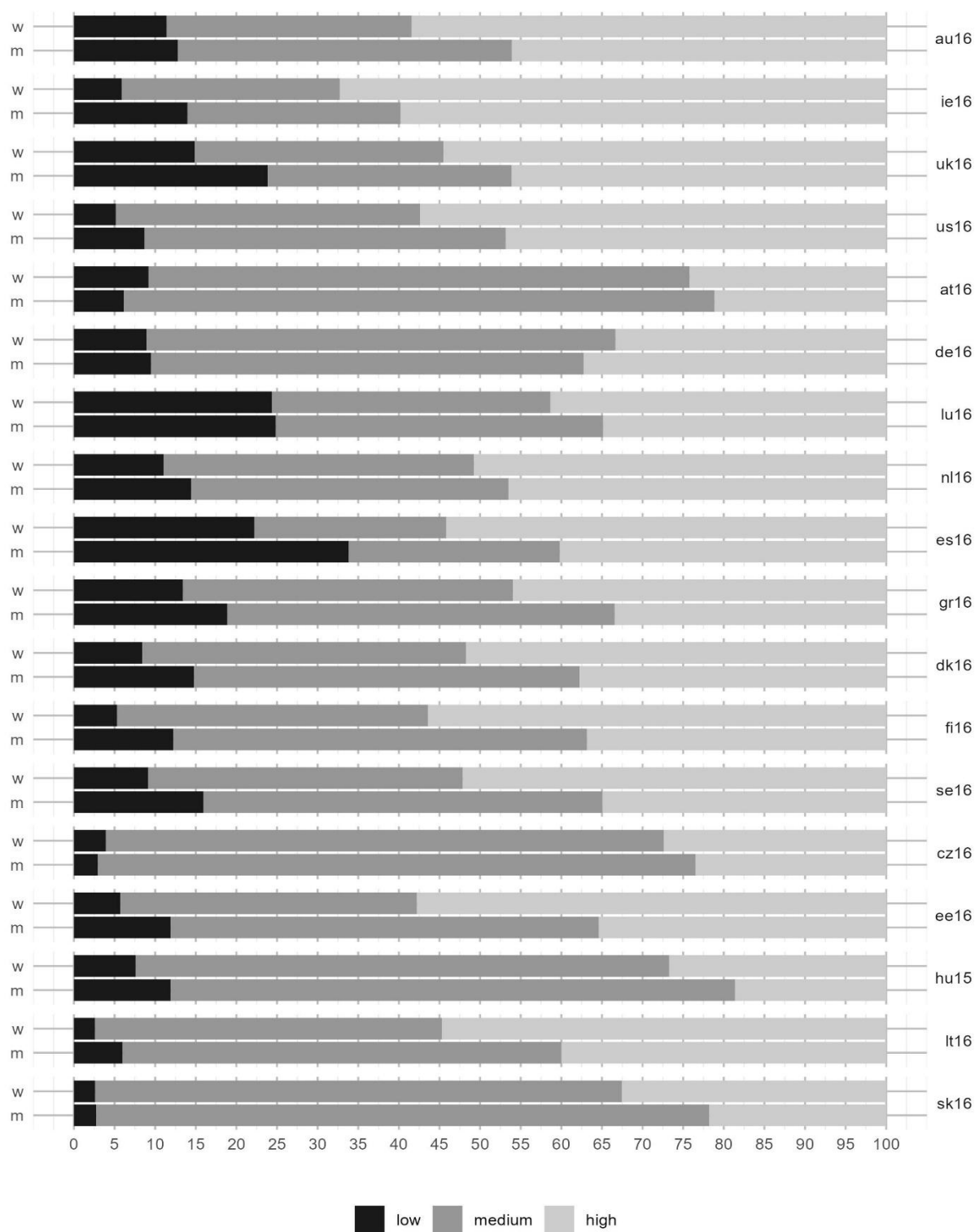
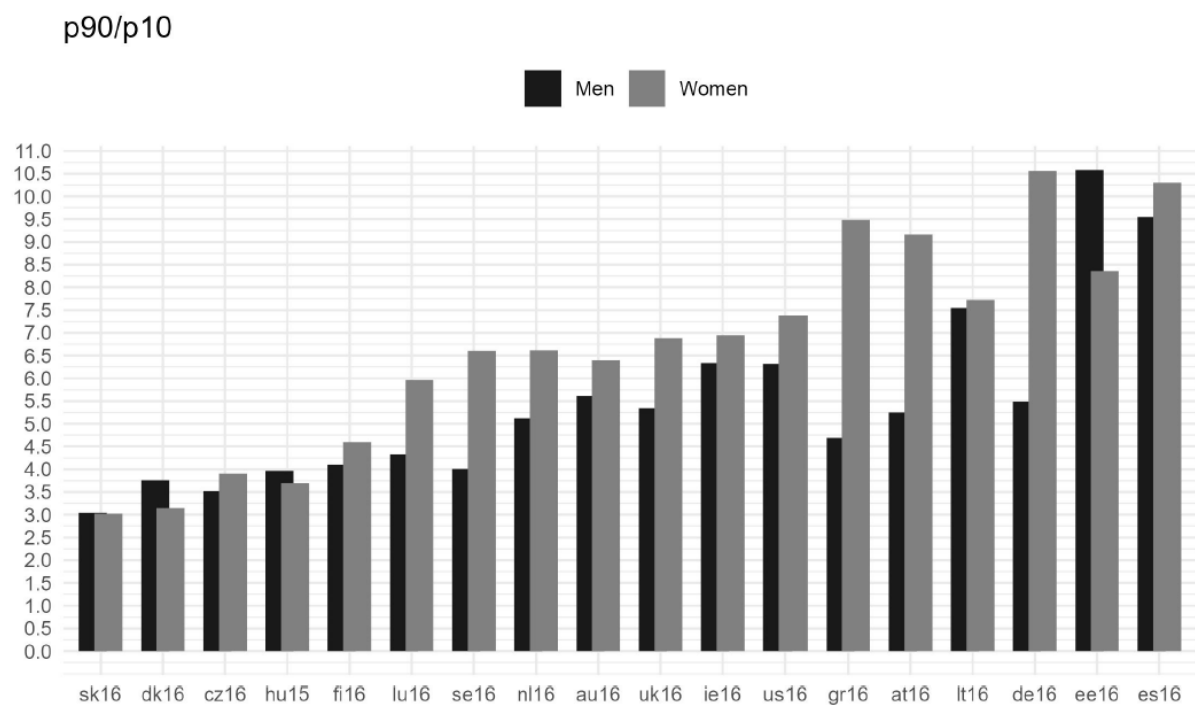


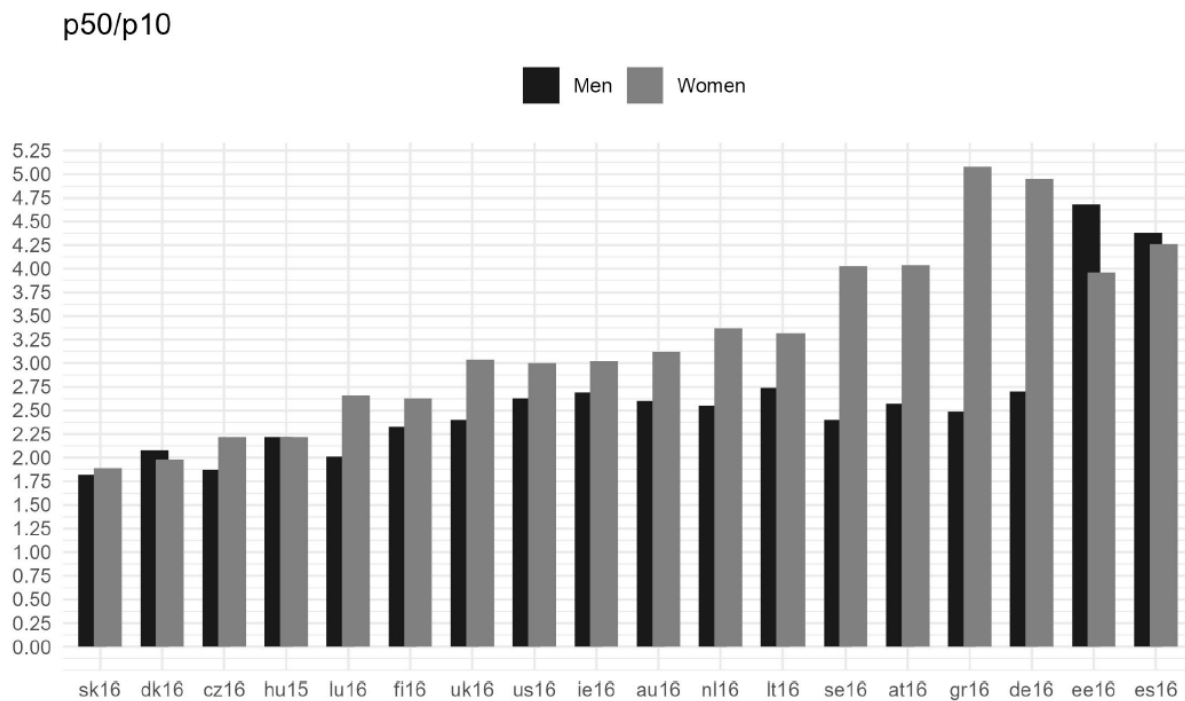
Figure 2 shows the p90/p10 employed, working-age earnings inequality for each country disaggregated by gender. This measure of inequality shows the ratio of labor earnings of the 90th percentile, near the top of the earnings distribution, compared to the 10th percentile, near the bottom of the income of the distribution. Higher values indicate more earnings inequality. For some of the Nordic and Post-Socialist countries, earnings inequality is low and the difference for men and women is small. In Greece, Austria, and Germany, which have higher inequality for both men and women, earnings inequality among women is much higher compared to men. Estonia is the only country where earnings inequality among men is higher than among women, though compared to other countries both figures are among the highest.

Figure 2: p90/p10 Earnings Inequality by Gender



Note: This ratio represents that relation of the 90th percentile of the earnings distribution to the 10th percentile. In other words, someone at the 90th percentile makes x times more than someone at the 10th percentile.

Figure 3: p50/p10 Earnings Inequality by Gender



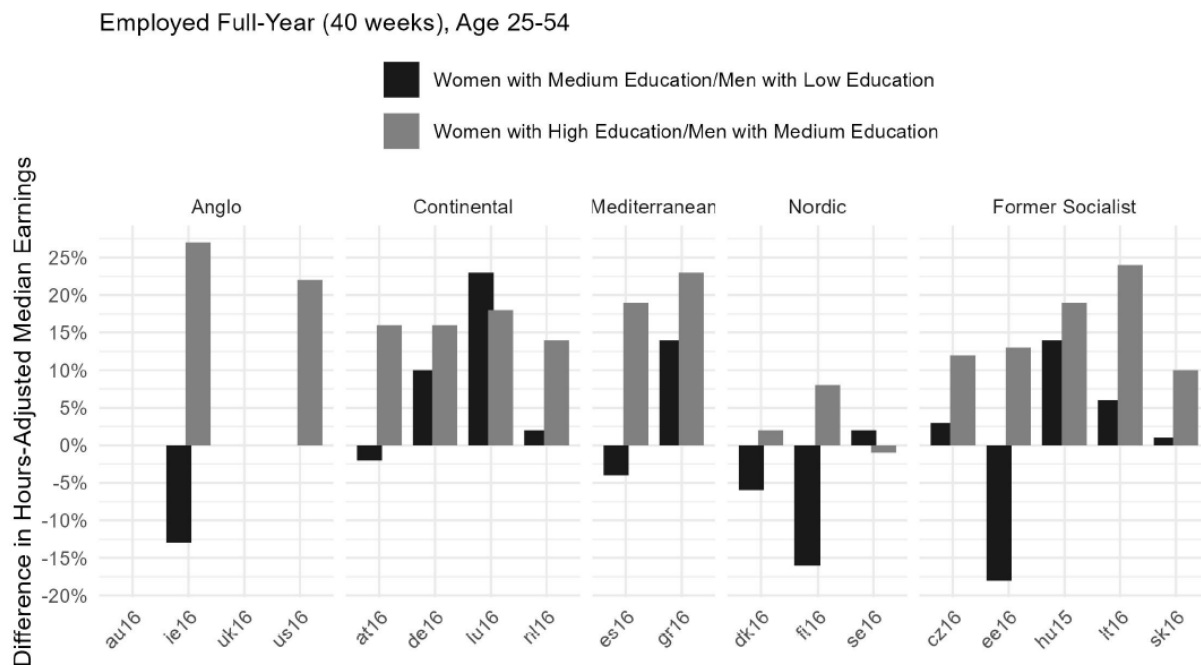
Note: This ratio represents that relation of median earnings to the 10th percentile. In other words, someone at the median makes x times more than someone at the 10th percentile.

The trend is similar for p50/p10 earnings inequality. That is, the ratio of earnings at the 10th percentile to the median. Sweden, Austria, Greece, and Germany have much higher earnings inequality among women than men, while in Estonia the opposite is true. On the other end, Slovak Republic, Denmark, Czech Republic, and Hungary have relatively lower bottom-half earnings inequality and only slight disparities between men and women.

The “staggered education gender gap” (StEGG) is shown in Figure 4. This shows the ratio hours-adjusted median earnings for employed full-year working-age women with a higher educational attainment than men. The black bar shows the ratio that women with medium education earn compared to men with low education, and the gray bar compared women with high education to men with medium education. In Ireland, Austria, Denmark, Finland, and Estonia, the hours-adjusted median earnings is actually lower for women with

medium education compared to men with low education. In most other countries, with the exception of Luxembourg, Greece, Hungary, and perhaps Denmark, the advantage in earnings is modest. In all countries, women that have high education make more than men with medium education, except for Swedish women who make slightly less. In Ireland, women with high education earn over 25 percent more than men with medium education. The Nordic countries stand out with the smallest earnings ratios for women with high education compared to men with medium education. The Anglo and Mediterranean countries show the largest ratio for high educated women compared to medium education men, while the Continental and Former Socialist countries have more modest ratios. This exercise is not to extract any definitive findings, but to represent the paradox of human capital theory (Becker & Tomes, 1986) and the gender earnings disparity. These initial

Figure 4: Staggered Education Gender Gap (StEGG)



Notes: Hours-Adjusted Median Earnings Differentials for Women with Educational Attainment One Level Higher Compared to Men. Australia & UK not included due to missing hours worked data. The missing bar for the US indicates zero difference.

descriptives, however, are fairly consistent with the second stage of multivariate analysis (when the gender and education effects are calculated).

Turning now to multivariate analysis, the first regression results show earnings differentials by education level when disaggregated by gender. These can be found in Table 1. As opposed to the hours-adjusted median differential, these regressions control for experience, occupation, industry, partnership, and parental status. The logit-rank difference in earnings between high and medium attainment is statistically significant and positive for all countries, for both men and women. That is to say, men who have high education earn a statistically significant amount more than men with medium education, and the same holds when comparing women. While more education being associated with higher earnings may seem like an obvious finding, the uniformity of the results for high education do not match when considering a level down, i.e., the logit-rank difference between medium and low education.

In only 7 of 18 countries do women with medium education earn a statistically significant amount more than women with low education. For men, all but 3 countries show that medium education pays off compared to low education. The difference is not statistically significant for Ireland, Finland (where it is actually negative), and Estonia. There does not seem to be a pattern by country cluster when looking at the medium attainment logit-rank difference. Hungary has the highest value for both men and women at medium attainment and for men at high attainment, where women who have high education make nearly double women with medium education, and men earn more than double. The lowest logit-rank differences for high education both men and women are in Sweden.

Table 1: Median and Regression Earnings Differentials

Country, Year	Differential Between Low and Medium Attainment		Differential Between Medium and High Attainment	
	Hours- Adjusted Median Ratio	Logit-rank Difference	Hours- Adjusted Median Ratio	Logit-rank Difference
Employed Working-Age Women				
Australia, 2016	-	0.07	-	0.521***
Ireland, 2016	0.14	0.218	0.39	0.646***
United Kingdom, 2016	-	-0.057	-	0.458***
United States, 2016	0.27	0.278***	0.4	0.727***
Austria, 2016	0.2	0.094	0.31	0.424***
Germany, 2016	0.32	0.313**	0.27	0.433***
Luxembourg, 2016	0.3	0.211*	0.29	0.535***
Netherlands, 2016	0.22	0.141	0.24	0.535***
Greece, 2016	0.29	0.493***	0.3	0.551***
Spain 2016	0.16	0.08	0.35	0.440***
Denmark, 2016	0.1	0.207***	0.17	0.433***
Finland, 2016	0.09	0.116	0.22	0.378***
Sweden, 2016	0.14	0.089	0.12	0.277*
Czech Republic	0.19	0.068	0.3	0.673***
Estonia, 2016	0.13	0.08	0.37	0.440***
Hungary, 2015	0.26	0.760**	0.32	0.928***
Lithuania, 2016	0.15	0.211*	0.4	0.637***
Slovakia, 2016	0.18	0.179	0.26	0.674***
Employed Working-Age Men				
Australia, 2016	-	0.259**	-	0.505***
Ireland, 2016	0.05	0.234	0.33	0.642***
United Kingdom, 2016	-	0.208***	-	0.520***
United States, 2016	0.23	0.475***	0.38	0.766***
Austria, 2016	0.16	0.370*	0.26	0.327*
Germany, 2016	0.22	0.389***	0.33	0.759***
Luxembourg, 2016	0.33	0.509***	0.3	0.485***
Netherlands, 2016	0.13	0.281**	0.27	0.580***
Greece, 2016	0.23	0.346***	0.26	0.639***
Spain 2016	0.16	0.299***	0.29	0.670***
Denmark, 2016	0.1	0.249***	0.18	0.337***
Finland, 2016	0.02	-0.094	0.26	0.354***
Sweden, 2016	0.14	0.374*	0.1	0.299*
Czech Republic	0.23	0.470**	0.29	0.473***
Estonia, 2016	0.14	0.119	0.34	0.792***
Hungary, 2015	0.28	0.673**	0.36	1.238***
Lithuania, 2016	0.27	0.513*	0.4	0.620***
Slovakia, 2016	0.19	0.431*	0.2	0.571***

When these regression results are compared to gender-specific inequality distributions in each country, there are no statistically significant relationships. In other words, the logit-rank earnings differences do not correlate with inequality at the p90/p10, p90/50, or p50/10 distributions when both measures are disaggregated by gender.

Table 2: Predicted Effects of Gender and Educational Attainment on Earnings

Country, Year	Effect of Gender		Effect of Education		R^2
	Medium Education	High Education	Medium Education	High Education	
Australia, 2016	-0.675	-0.635	-0.193	-0.153	0.3279
Ireland, 2016	-0.565	-0.51	0.053	0.108	0.4193
United Kingdom, 2016	-0.618	-0.539	-0.173	-0.095	0.3733
United States, 2016	-0.879	-0.791	-0.042	0.046	0.3577
Austria, 2016	-0.688	-0.521	-0.302	-0.135	0.4192
Germany, 2016	-0.432	-0.766	-0.102	-0.436	0.5318
Luxembourg, 2016	-0.527	-0.378	-0.229	-0.08	0.4693
Netherlands, 2016	-0.414	-0.356	-0.075	-0.017	0.4668
Greece, 2016	-0.553	-0.514	0.325	0.365	0.419
Spain 2016	-0.429	-0.533	-0.113	-0.217	0.3597
Denmark, 2016	-0.857	-0.676	-0.014	0.167	0.4534
Finland, 2016	-0.998	-0.839	0.224	0.383	0.422
Sweden, 2016	-0.61	-0.486	-0.238	-0.115	0.3352
Czech Republic	-1.172	-0.936	-0.404	-0.167	0.4096
Estonia, 2016	-0.676	-0.78	0.057	-0.047	0.2332
Hungary, 2015	-0.732	-1.013	0.172	-0.11	0.3707
Lithuania, 2016	-0.806	-1.015	0.127	-0.082	0.2885
Slovak Republic, 2016	-0.898	-0.626	-0.214	0.058	0.2787

Notes: Negative values indicate male advantage and positive values female advantage.

The second regression considers both men and women to explore the relationship of overall earnings inequality, gender, and education. It includes an interaction between

educational attainment and gender, which is explored symmetrically. Thus, Table 2 shows predicted values for 1.) the effect of gender on logit-rank earnings moderated by educational attainment, and 2.) the effect of educational attainment on logit-rank earnings moderated by gender. The first shows the predicted gender earnings gap at different levels of education and the second shows the predicted educational earnings gap as it is experienced by men and women. They are, essentially, differences in differences.

The first and most notable finding is that the effect of gender on returns to education is a negative (indicating female disadvantage) result for both medium and high education in all countries. At medium education, the magnitudes are generally highest in the Former Socialist, Nordic, and Anglo countries, while lower in the Continental and Mediterranean countries. For high education, the magnitudes are fairly consistent across country clusters, with the exception of the Former Socialist countries, with Lithuania, Hungary, and Czech Republic having the largest negative values. Thus, while the effect of gender at medium education has smaller differences in magnitudes among countries and clusters, there appear to be some patterns. At high education, on the other hand, there are large differences in magnitudes, but these magnitudes are only consistent in several of the Former Socialist countries.

In half of the countries, the education effect at medium education is positive (indicating female advantage). In those countries, it is predicted that women earn more than women with lower educational attainment compared to men and their lower education counterparts. The education effect is positive in 3 out of 5 Former Socialist countries and 2 out of 3 Nordic countries, while it is negative in all the Continental

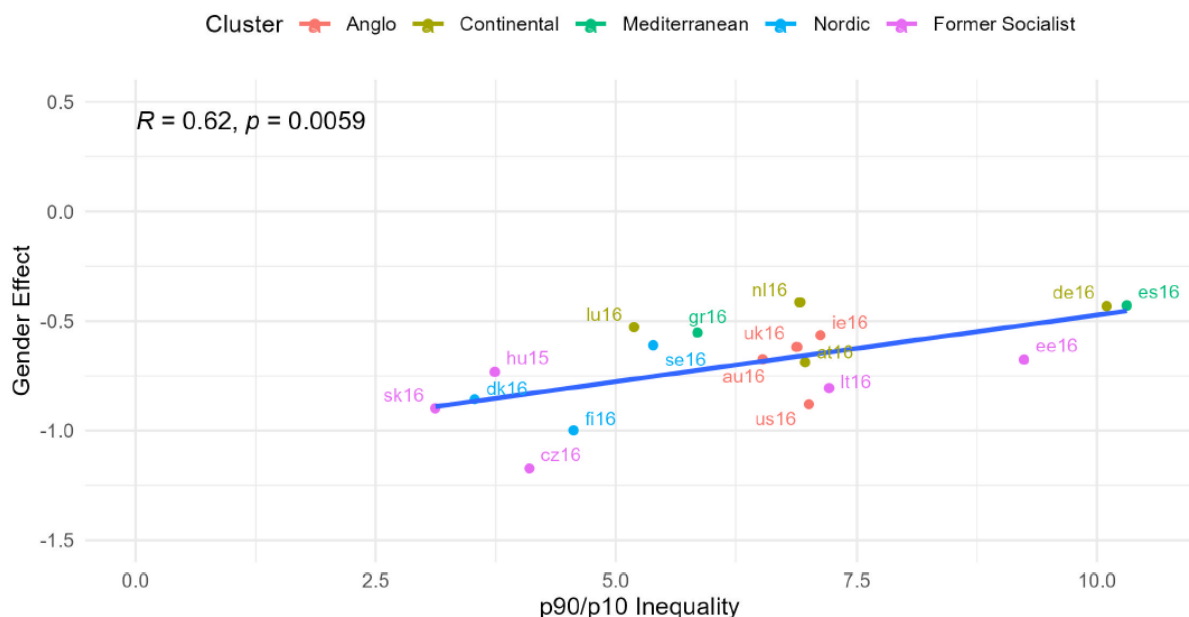
countries and 3 out of 4 Anglo countries. The highest predicted value for medium education is in Greece (0.325) and lowest in Czech Republic (-0.404).

One third (6) of countries have a positive education effect at high education. Two are Anglo (Ireland & the US), two are Nordic (Denmark & Finland), and the other two are Greece and Slovak Republic. Finland and Greece have the highest predicted values for the effect of education, while Germany has the lowest (-0.436). The magnitudes of the predicted effects of education are generally lower than the predicted effects of gender, and as discussed, sometimes positive (female advantage).

Figure 5: Relationship of Gender Effect to Overall p90/p10 Earnings Inequality

Medium Education

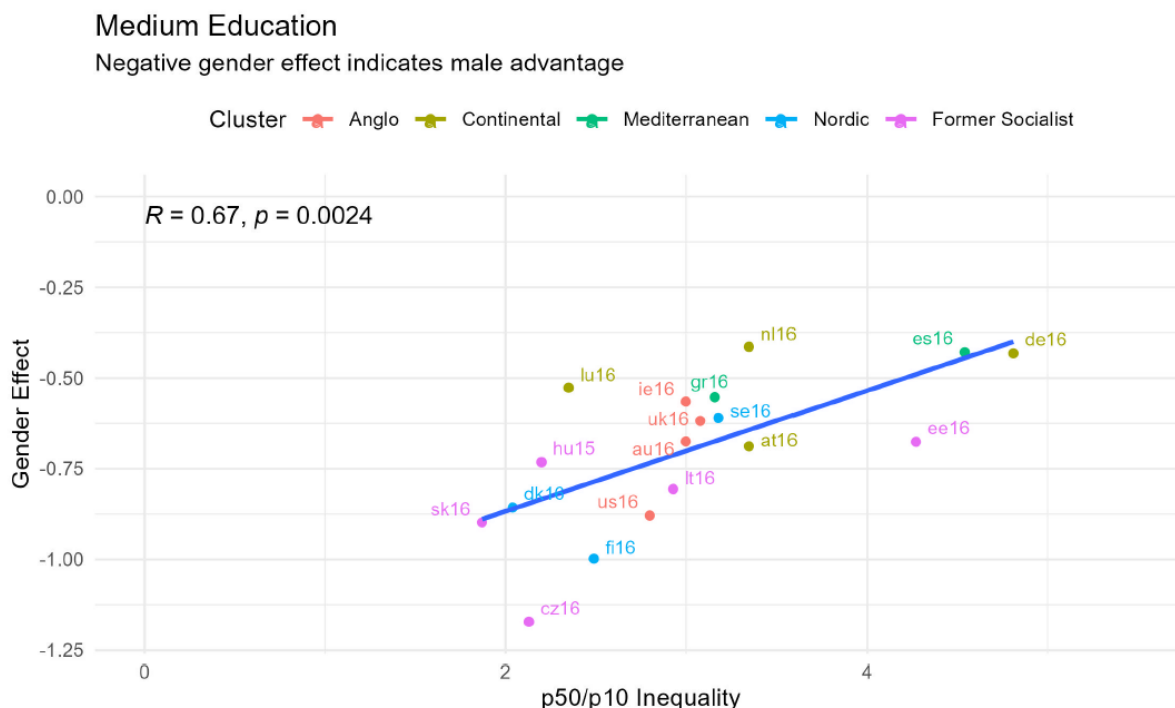
Negative gender effect indicates male advantage



The relationship between the gender effect at medium education and p90/p10 earning inequality is shown in Figure 5. Countries with a larger difference in earnings between the 90th percentile and the 10th percentile, such as Germany, Spain, and Estonia showed some of the smallest gender effects. On the other end of the spectrum, countries with smaller ratios between earnings at the top compared to the bottom tended to have

larger gender effects, such as Slovak Republic, Czech Republic, Hungary, Denmark, and Finland. Thus we see a positive and statistically significant relationship between overall

Figure 6: Relationship of Gender Effect to Overall p50/p10 Earnings Inequality

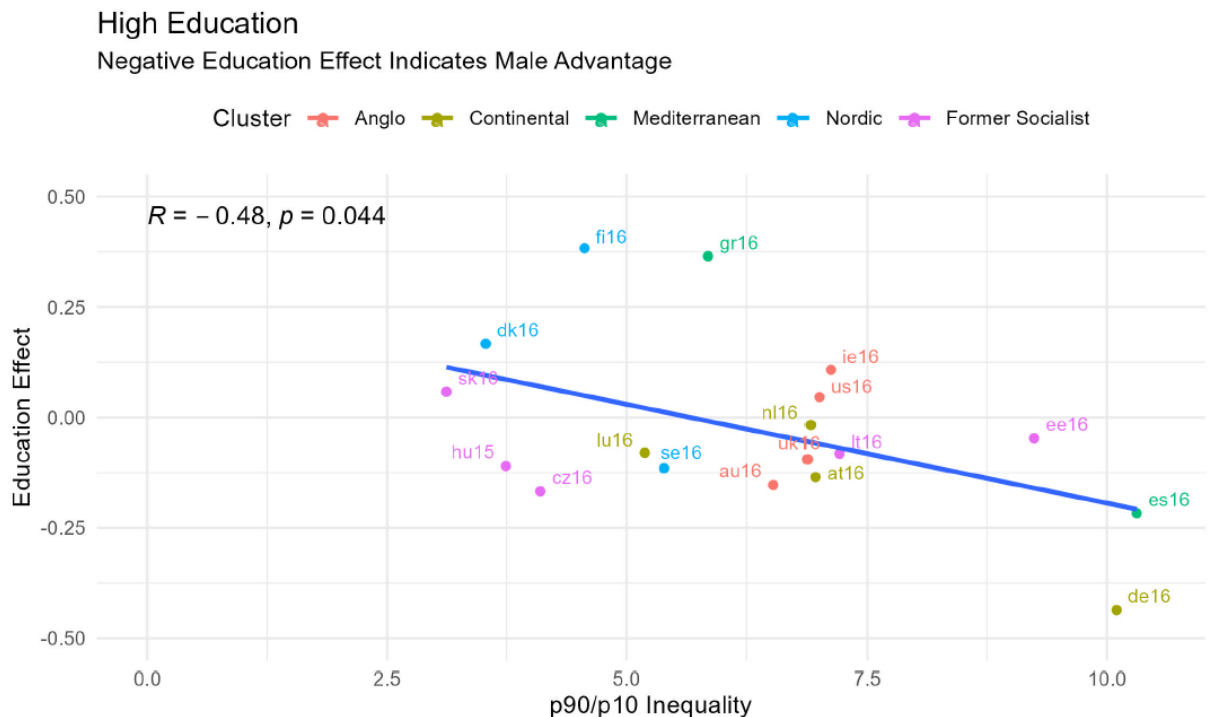


p90/p10 inequality and a smaller gender effect. Subsequently, a larger gender effect (female disadvantage) is associated with lower overall p90/p10 earnings inequality.

This seemingly paradoxical relationship also holds at medium education when using the ratio for p50/p10 inequality, i.e. the middle to near the bottom (Figure 6). Countries such as Slovak Republic, Czech Republic, and Finland have small ratios of p50/p10 earnings inequality yet have the largest gender effect at medium education. Again, we see a positive, statistically significant relationship between overall earnings inequality and a smaller gender effect. It is worth noting that none of the countries considered have a *positive* gender effect. Results for all the countries indicate that there is a female disadvantage at medium education.

As noted, we see some patterns among country clusters, but none of the patterns appear without exceptions. Most of the countries are positioned in the middle of the plot,

Figure 7: Relationship of Education Effect to Overall p90/p10 Earnings Inequality

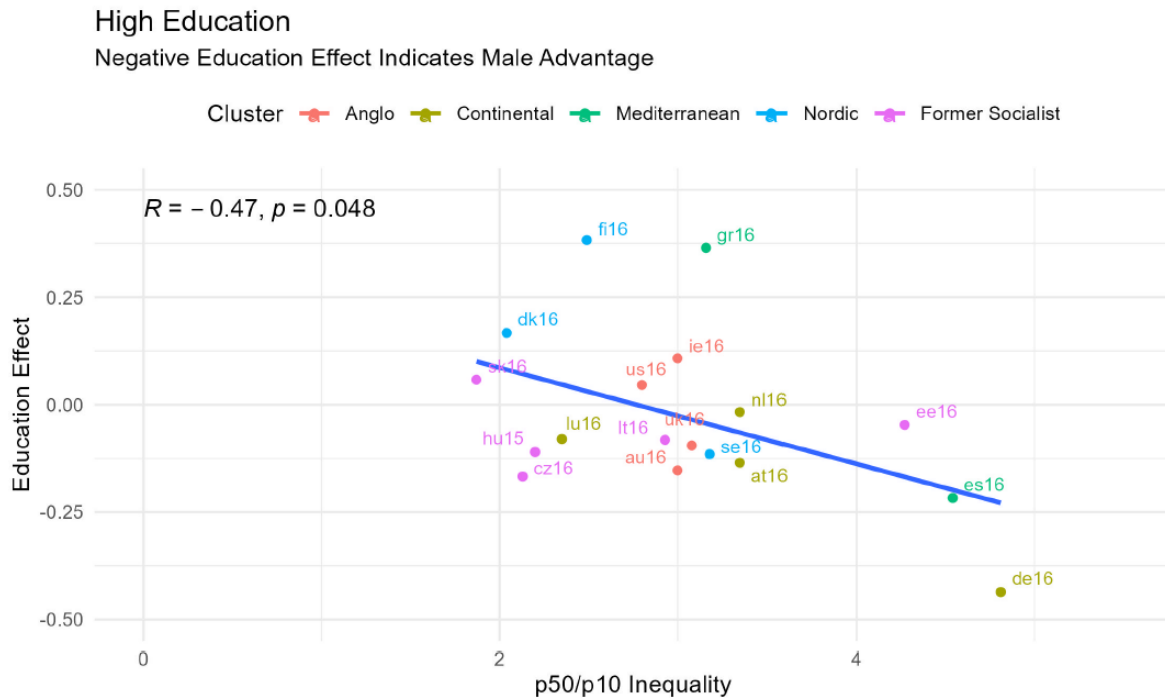


while some of the Nordic and Former Socialist countries showed to have low measures of inequality and higher magnitudes of the gender effect.

The relationship is reversed when the education effect is considered in relation to inequality. Figure 7 shows the relationship between the education effect at high education and p90/p10 earnings inequality. Countries such as Denmark, Slovak Republic, and Finland that had positive education effects (female advantage) at high education also have smaller ratios of earnings between the 90th and 10th percentiles of earners. Countries with higher inequality in this category also tended to have negative education effects at high education, though there are several exceptions, including the US and Ireland. Again, some of the

Former Socialist and Nordic countries are situated on the top left of the plot, while the Anglo countries sit near the middle.

Figure 8: Relationship of Education Effect to Overall p50/p10 Earnings Inequality



Finally, Figure 8 shows p50/p10 inequality in relation to the education effect at high education. The results are very similar to those displayed in Figure 7. Both show a negative, statistically significant relationship between the education effect at high education and bottom-half earnings inequality. A positive education effect (female advantage) tends to be associated with less bottom-half inequality, while a negative education effect (male advantage) tends to be associated with higher bottom-half inequality.

Discussion & Conclusion

This paper builds on and replicates previous findings. It also introduces novel results and paths for further research. It confirms Sullivan & Smeeding's (1997) findings that there is a relationship between education earnings differentials and gender-specific

inequality but that these differentials vary considerably across countries, using an expanded sample. Regression analysis with an interaction between gender and education reveals that although lower “gender effects” are associated with higher levels of overall earnings inequality, larger “education effects” are associated with lower levels of overall earnings inequality. Testing for the effect of gender yields a disadvantage for women in almost all cases at both the medium and high education level. Put differently, men seem to be benefitting more compared to women when compared at different education levels, but in some cases, women have the advantage in making greater strides with educational attainment within their group compared to men.

This is consistent with the descriptive figure “staggered education gender gap” (StEGG), which shows that women who have an educational advantage over men are often not earning more or even the same amount. Women may be benefiting more within their group by advancing in educational attainment, but those effects are subdued by the negative effect of gender on earnings. In certain contexts, class origin may have an even larger effect for women than it does for men in intergenerational mobility (Bukodi & Paskov, 2020). It also has implications for the growing class-cleavage between those with higher education and those without (Case & Deaton, 2023).

The World Bank (2023) reports that increased female labor market participation in high-income countries is narrowing the gender wage gap over time. Female full-time participation has been increasing and can reduce earnings inequality (Bardasi & Gornick 2008; Harkness, 2013). In multivariate analysis, full-time status has been added as a control. Occupation is also controlled for in this analysis, but it is not possible to discern how different tracks, such as a certain university major or occupational training, will affect

occupational status in the labor market. A bachelor's in French literature may not produce earnings outcomes similar to a bachelor's in computer science, or depending on the labor market, occupational training at the upper-secondary level. More granular analysis on the connections between education level – and type – and occupational status may shed additional light on these questions.

This study does not make any causal claims about whether the gender earnings gap is being reduced by educational attainment by women. I have shown that in some cases women are benefiting more for their educational attainment than men, but the rewards are still predicated on gender specific difference (Blau & Kahn, 1992). Differences in fields of study, and how various fields of study are treated in the labor market are of acute interest here.

The heterogeneity of educational systems, as part of the institutional structure of welfare states, invites further inquiry. The results of this study indicate that the gender earnings gap persists, though it varies considerably by country. Moreover, though women at the same education level earn less in the labor market than men, the *effect* of higher educational attainment is insignificant or in some cases reversed. This means that in some countries, women who are attaining tertiary education are actually making larger jumps in labor market earnings than their male peers. This is tempered, however, by the fact that the greater differential in educational earnings still results in lower earnings overall for women. This suggests that if women were not outpacing men in educational attainment, the gender earnings gap would be even greater. Finally, there is a strong correlation between

disparities in labor earnings and bottom-half inequality when considering gender effects and education effects in earnings differentials.

There are cases where differences in premiums to education are favorable to women and occurring both at the medium and high education level. This again suggests that the structure of the labor market matters for how people are "tracked" into different occupations via education and training. But it also reflects the "supply side" of education in the labor market. The "demand side" in the labor market may also produce different outcomes, especially for female employment, yet another consideration in this calculus. If a labor market simply has few full-time jobs open at any given time, this will affect participation.

It is also important to emphasize that this study is not estimating "payoffs" for education in the labor market. It shows that there are significant differentials in labor earnings at different levels of education and disparities by gender, but how education ultimately determines labor market outcomes is related to a host of factors like cost and quality of education, family background, and job-matching (Triventi, 2012). For example, education at the tertiary level is particularly expensive in the United States and virtually free in Germany.

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