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Inequality Among Women: Is There Variety?

Petra Sauer, Rosa Mulè

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Inequality among women:

Is there variety?

Sauer Petra

(University of Fribourg, Vienna University of Economics and Business, Luxembourg Institute for Socio-economic Research; petra.sauer@unifr.ch)

Rosa Mulè

(University of Bologna; rosa.mule@unibo.it)

Author contributions

Petra Sauer: Conceptualization, Methodology, Formal Analysis, Visualization, Writing – Original Draft, Writing – Review & Editing

Rosa Mulè: Conceptualization, Methodology, Writing – Original Draft, Writing – Review & Editing

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Abstract

The expansion of women's education and employment has transformed labor markets across advanced democracies. Yet comparatively little is known about how educational wage inequality among women has evolved across countries and over time. This article examines wage gaps between college- and non-college-educated women in the United States, Germany, and Sweden between 1991 and 2020. We propose a framework of *women's inequality regimes* that captures the interplay between labor market and family policies in shaping women's economic opportunities and constraints. Drawing on data from the Luxembourg Income Study and using unconditional quantile regression, we analyze both the magnitude of educational wage inequality and the extent to which it is driven by women at the top or bottom of the wage distribution. We find that educational wage inequality is largest in the United States and smallest in Sweden, while Germany occupies an intermediate position but exhibits the most pronounced increase over time. This increase is driven by both rising wages among highly educated women at the top of the wage distribution and the growing concentration of low-educated women at the bottom. Our findings indicate that the institutions facilitating women's labor market integration also shape women's inequality regimes, with important implications for social stratification and household inequality.

Keywords: inequality among women, educational wage gaps, labor market dualization, cross-country configurations

1. Introduction

In capitalist economies, women's employment rates have increased substantially over the past six decades. This trend has prompted scholars to investigate the drivers of the global "feminization of employment" (Torrejon et al. 2024). The expansion of women's employment has been linked to both educational attainment and structural economic change (Buchmann and DiPrete 2006; Steiber et al. 2016; Pettit and Hook 2005), yet its consequences for inequality among women remain insufficiently understood (McCall 2007).

The feminization of employment has reduced some forms of inequality among women by lowering the proportion of women with no earnings (Cancian and Reed 1998; Gregory 2012; Nieuwenhuis and Van Lancker 2020). However, this equalizing effect may weaken if wage disparities among employed women grow. Indeed, existing research indicates that the expansion of women's employment has been stratified by class (McCall 2008) or along ethnic lines (England et al. 2004). This suggests that the gender revolution in the labor market has progressed unevenly (England 2010), resulting in a dualization of women's labor market outcomes. This dualization is reflected, among other things, in increasingly divergent labor market trajectories between highly educated and less-educated women. While growing numbers of college-educated women have entered professional and managerial occupations, less-educated women have become increasingly concentrated in insecure, low-paid, and non-standard employment (Manning and Petrongolo 2008; McCall 2000; Seo 2023).

This article investigates the intersection of gender and social class through an analysis of women's educational attainment and earnings, tracing the evolution of wage differentials between college- and non-college-educated women in the United States, Germany, and Sweden over the past three decades. While educational wage gaps provide only a partial account of inequalities in women's living standards and life chances, they capture a salient dimension of class stratification among women (McCall 2000; England 2010). Since college education is a key determinant of access to high-status positions in post-industrialist societies, it likewise structures access to economic and social resources (Mandel and Rotman 2025).

We address two questions: how educational wage gaps among women vary across capitalist systems and over time, and which institutions underpin these differences. Inspired by Acker (2000, 2006), we propose a framework of *women's inequality regimes* that captures cross-national variation through the interplay between labor market institutions and family policies.

We contribute to this literature in three ways. First, we move beyond the mainly U.S.-focused evidence (McCall 2000; Mandel and Rotman 2021), by providing a comparative analysis of educational wage inequality among women. Using Luxembourg Income Study (LIS) data, we examine hourly wage gaps between college- and non-college-educated women in the United States, Germany, and Sweden from 1991 to 2020. These countries represent different varieties of capitalism (Hall and Soskice 2001) and, as we argue, distinct regimes of women's inequality. Second, we adopt a distribution-sensitive approach by applying unconditional quantile regression to assess whether educational wage gaps are primarily driven by the relative advantage of highly educated women at the top of the wage distribution or by the disadvantage of less educated women at the bottom. Third, we investigate the extent to which the relative positions of highly educated and less educated women in the wage distribution are associated with key dimensions of labor market dualization, including working hours, temporary and public-sector employment, as well as employment in professional and managerial occupations. More broadly, the article complements research on inequality between women and men by investigating class-based inequalities among women themselves. In doing so, it illustrates how the institutional arrangements that facilitated women's integration into paid employment may have also shaped the distribution of economic rewards among women.

The remainder of the article is organized as follows. We first review existing research on wage inequality among women and develop our theoretical framework. We then describe the data and methodology before presenting the empirical results. The final section discusses the implications of our findings and identifies avenues for future research.

2. Literature review and theoretical framework

2.1. Education wage gaps and inequality among women

With notable exceptions (McCall 2000), the literature on wage inequality between college- and non-college-educated workers has been developed largely through analyses of men. This body of research identifies three main drivers of inequality in contemporary capitalism. First, technological change has increased the demand for skilled relative to less-skilled labor, thereby raising the wage premium associated with higher levels of education and skills (Acemoglu and Autor 2011). Second, globalization, international trade, and immigration have intensified competition among low-skilled workers, exerting downward pressure on their wages (Milanovic 2016). Third, the transition from a manufacturing-based economy to a service-oriented one has weakened traditional institutions of wage-setting and collective bargaining, contributing to greater wage dispersion (Ebbinghaus and Visser 2000).

These transformations affected women and men differently. In the United States, the growth of high-technology services expanded employment opportunities for women across educational groups, while gains for men were concentrated among the highly educated (McCall 2000). Globalization weakened the labor market position of less-skilled men. Two factors have particularly shaped inequality among women. First, structural change has contributed to the concentration of less-educated women in low-paid, insecure service-sector jobs (McCall 2000, 2007; Kalleberg 2009; Rubery 2015; Seo 2021, 2023). Second, the decline of gender discrimination in education and employment has broadened access to higher education and professional occupations. College-educated women have achieved substantial earnings gains in a context of rising returns to education, while less-educated women have benefited far less (McCall 2007, 2008). Consequently, the feminization of employment has narrowed gender wage gaps but intensified class-based inequalities among women, producing greater differences in labor market outcomes across educational levels (McCall 2008; Seo 2021, 2023).

Educational wage inequality among women has recently attracted renewed scholarly attention (Mandel and Rotman 2025), although existing research remains centered on the United States. McCall (2007, 2008), for instance, examines class inequality among female workers across the earnings distribution and shows that women at the top became increasingly detached from the rest between 1970 and 2000. In an earlier study, McCall (2000) analyzes gender-specific educational wage gaps across regional labor markets in the United States and finds that the education wage gap was larger among women than among men. Her findings point to reduced working hours as a key factor underlying the low earnings of less-educated women at the bottom of the wage distribution and highlight the importance of employment de-standardization in shaping educational wage inequality among women. More recently, Mandel and Rotman (2021) show that the relative size of women's educational wage gap depends on the measure employed: by some indicators it remained smaller than men's since the 1980s, whereas by others it was larger until the early 2000s, after which it became comparatively smaller.¹

Although these studies have advanced our understanding of the changing nature of class inequality among women, their concentration on individual countries constrains the analysis of how educational wage inequality varies across national contexts. Cross-national differences are likely to reflect variation in the institutional and policy arrangements that both enable women to translate educational

¹ When measured in relative terms (using the logarithm of wages as dependent variable) women's wage gap is larger than for men until the 2000s but has been smaller thereafter. In contrast, when measured in absolute terms (using wages in real terms as dependent variable) to capture the economic distance between college and non-college educated workers they find that the gap has been larger for men than for women already since the 1980s (see also Mandel and Rotman 2025).

gains into labor market rewards and protect less educated women with limited earning capacity from the risks associated with economic restructuring.

To address this gap, the next section proposes a comparative framework of women's inequality regimes. The framework identifies the institutional configurations associated with higher or lower levels of educational wage inequality among women by examining the extent to which they facilitate the economic advancement of college-educated women at the upper end of the wage distribution while protecting less-educated women, who are disproportionately concentrated in low-paid and insecure employment, at the lower end.

2.2. Women under different inequality regimes

Research on comparative capitalism has primarily examined how institutional arrangements shape gender differences in employment and earnings (Estevez-Abe et al. 2001; Iversen et al. 2005, 2020). More recent research has shifted attention from inequalities between women and men to inequalities among women themselves (Hook et al. 2023; Mandel and Shalev 2009). This literature highlights the importance of labor market institutions and family policies in shaping the distribution of employment opportunities and earnings within the female workforce. Employment regulations may protect less-skilled women while limiting advancement opportunities for highly skilled women (Iversen et al. 2020; Estevez-Abe 2005). Moreover, generous parental leave provisions may reinforce labor market attachment among more vulnerable groups of women while simultaneously slowing career advancement among the highly educated (Hook et al. 2023; Mandel and Semyonov 2006, 2005). By contrast, childcare services facilitate both labor market entry and employment continuity, thereby fostering women's integration into paid work (Hook et al. 2023; Pettit and Hook 2005). Active labor market policies, including training and retraining programs, can further alleviate these trade-offs by strengthening women's attachment to the labor market, supporting re-entry following career interruptions, and enhancing employment opportunities (Mulè and Rizza 2023).

Yet existing scholarship has largely examined labor market regulation and family policies as distinct institutional domains. We argue instead that their interaction is crucial: institutional complementarities shape the extent to which women with different levels of education can secure stable employment and pursue career advancement.

To explore cross-national variation in educational wage inequality among women, we focus on four institutional dimensions: employment protection legislation, active labor market policies, care

provision, and parental leave. Their interaction generates three ideal-typical regimes of women's inequality.

The first model is **social-democratic women's dualization**, characterized by women-friendly labor-market institutions embedded in a broadly redistributive welfare state. Guided by social-democratic principles, work–family reconciliation policies seek to promote gender equality in both paid and unpaid work through generous income support and extensive publicly provided or heavily subsidized care services (Kautto and Kuitto 2021). A defining feature of this model is substantial investment in active labor market policies, particularly training and retraining programs that strengthen women's labor market attachment, facilitate career continuity, and support re-entry into employment following career interruptions. Employment protection legislation is relatively flexible, while strong trade unions contribute to wage compression and lower levels of inequality.

Sweden exemplifies this institutional configuration. A distinctive combination of generous parental leave, universal and high-quality care services, and active labor market policies promotes women's labor market participation across educational groups (Lewis and Åström 1992). By supporting employment continuity and facilitating labor market re-entry after career interruptions, this institutional arrangement encourages both highly educated and less-educated women to maintain stable attachment to paid work. Less-educated women are better able to maintain stable employment because generous leave provisions and accessible care services reduce the work–family constraints that often undermine labor market participation. Highly educated women are less exposed to the long-term career costs of motherhood, as retraining opportunities and active labor market programs help preserve skills and facilitate occupational continuity. Consequently, this model mitigates the trade-off between protecting vulnerable female workers and preserving advancement opportunities for highly skilled women, thereby limiting the extent of class inequality within the female workforce (Lister 2009).

The second model is **conservative women's dualization**. This regime is rooted in a legacy of socially conservative norms that historically reinforced traditional family arrangements and a gendered division of labor, with women assuming primary responsibility for unpaid care work. Active labor market policies are historically less relevant than in the social-democratic dualization model. Although their importance has increased over recent decades, they have primarily emphasized employment incentives and rehabilitation programs designed to encourage unemployed individuals to accept jobs, rather than training programs intended to promote employment continuity (Vlandas 2013). Amid labor market liberalization, institutional protections remain sufficiently strong to support

labor market insiders yet provide limited protection against the emergence of class inequalities among women.

Germany represents the archetypal case of this regime. Although Germany and Sweden are both coordinated market economies, they differ markedly in the institutional arrangements governing work and family life. Compared with Sweden, Germany has traditionally relied more heavily on the family as a provider of care. Evidence suggests that most children aged 0–2 in West Germany and around half in East Germany continue to be cared for through informal arrangements involving mothers, grandparents, or other family members, and that the expansion of formal childcare provision has benefited college-educated women disproportionately (Neuberger et al. 2022). Moreover, Germany has invested less extensively in public services that support women's continuous labor market participation and, through the implementation of the Hartz reforms, prioritized employment incentives over retraining measures (Brady and Biegert 2017; Vlandas 2013).

This pattern highlights a marked class-based stratification in the access to care services and the impacts of labor market liberalization, with important implications for employment continuity and labor market security among women. In this context, policies designed to promote women's labor market integration and career progression have primarily advantaged college-educated women, increasingly enabling them to pursue rewarding careers, while women with lower levels of education have remained disproportionately vulnerable to precarious employment and economic marginalization. The result is a form of conservative women's dualization that reproduces class inequalities within the female labor force without fully relying on the market-oriented mechanisms typical of liberal regimes.

The third model is **liberal women's dualization**, which most closely reflects a market-oriented approach to labor market regulation and social policy. In this regime, public investment in labor market interventions is limited, employment protection is weak, and social protection for low-wage workers is relatively modest. Unlike the social-democratic model, its primary objective is not the promotion of gender equality but the enhancement of labor market flexibility and individual responsibility. Care services are largely organized through the market, making access strongly dependent on households' economic resources (O'Connor et al. 1999). These arrangements have important class implications. Because childcare and other care services are predominantly provided through private markets, highly educated women with higher incomes are better positioned to purchase the support necessary to sustain continuous employment and pursue demanding careers. In a context of weak employment regulation and limited family policy provision, they are therefore more

likely to access professional and managerial occupations and to benefit from the high returns associated with these positions. (Hook and Paek 2020). Less-educated women, by contrast, face greater difficulties reconciling paid work and caregiving responsibilities and are more likely to be concentrated in low-paid, insecure, and non-standard forms of employment. Liberal women's dualization generates a particularly pronounced divide between women at the top and bottom of the labor market, producing high levels of educational wage inequality within the female workforce.

The United States represents the archetypal case of this institutional arrangement. Compared with countries such as Sweden and Germany, its less regulated labor market and more dispersed wage structure allow highly educated women to capture substantially higher earnings, particularly in professional and managerial occupations. Weaker employment protections, more limited family policy provision as well as (re)training opportunities leave less-educated women more vulnerable to low pay, precarious employment, and interrupted careers, thereby reinforcing class divisions within the female workforce (Mandel and Rotman 2025).

2.3. Expectations

The three models of women's inequality regimes generate distinct expectations regarding educational wage inequality among women. These expectations are summarized in the following hypotheses:

- Educational wage inequality among women is expected to be highest in the liberal women's dualization regime of the United States and lowest in the social-democratic women's dualization regime of Sweden, with Germany's conservative women's dualization regime occupying an intermediate position.
- In Sweden, educational wage inequality among women is expected to be driven neither by exceptionally large advantages among highly educated women at the top of the wage distribution nor by severe disadvantages of less-educated women at the bottom, resulting in relatively small and evenly distributed contributions across the wage distribution.
- Educational wage inequality among women in the United States is expected to be driven more strongly by the earnings advantage of college-educated women at the top of the wage distribution than in Germany.
- The contribution of less-educated women at the bottom of the wage distribution to educational wage inequality is expected to be greater in the United States than in Germany, reflecting the stronger labor market insecurity associated with the liberal women's dualization regime.

3. Data

We draw on data from the Luxembourg Income Study (LIS), one of the most comprehensive sources of harmonized cross-national microdata, covering 52 countries across Europe, North America, Latin America, Africa, Asia, and Australasia over more than five decades.² LIS datasets provide comparable household- and individual-level information on labor and capital income, pensions, public and private transfers, taxes and social security contributions, expenditures, as well as detailed employment and socio-demographic characteristics.

Our analysis covers Germany and the United States yearly from 1991 to 2020, and Sweden from 1995 to 2020 (but with gaps between 1996 and 2013). We restrict each country-year sample to dependent employees aged 30-50 with completed education. The dependent variable is gross hourly wages, expressed in 2017 US Dollars (USD), top-coded at the 99th percentile, and bottom-coded at the 1st percentile. Our main explanatory variable, college education, defined as the completion of a tertiary degree (Bachelor's, Master's, or PhD). Individuals who have not completed upper secondary education are classified as low educated.

The analysis further controls for socio-demographic characteristics, including age, number of children, marital status, and migrant status, as well as employment characteristics such as part-time work, public-sector employment, managerial or professional occupation³, and temporary employment. Data on temporary employment are not available for the United States and are only available for Germany from 1993 onwards. Descriptive statistics are presented in Table A.1.1.

4. Analytical strategy

The first part of the analysis examines the evolution of absolute and relative wage gaps between college- and non-college-educated women across countries and over time. We estimate ordinary least squares (OLS) regression models in which (the logarithm of) gross hourly wages is regressed on an indicator of college education, controlling for age, age squared, part-time employment, marital status, number of children, and migration status. Using the logarithm of wages as dependent variable captures how much more college-educated women earn relative to low educated women, providing insights into the wage structure and indicating economic gains of investments into education (Mandel

² <https://www.lisdatacenter.org/our-data/lis-database/> (Luxembourg Income Study (LIS) Database (Germany, Sweden, United States, October 2025), n.d.)

³ Managerial or professional occupation is indicated as categories 1 or 2 in the International Standard Classification of Occupations (ISCO).

and Rotman 2021, 2025). Absolute wage gaps, in turn, measure the economic distance between college- and non-college-educated women in real terms. Since wage levels and distributions differ both across countries and over time, absolute and relative measures may paint different pictures of educational wage inequality. This issue may be particularly relevant in our analysis, as average wages have increased over time in all countries (Table A1) and wage compression is substantially stronger in Sweden than in Germany and the United States (Figure A1). Moreover, by compressing the upper tail of the wage distribution, the logarithmic transformation may understate inequalities associated with top earners, whose importance has grown alongside rising earnings concentration at the top (Mandel and Rotman 2021, 2025; Morelli et al. 2015). To capture these different dimensions of inequality, we present both absolute and relative wage gaps and analyze their evolution over time.

In the second part of the analysis, we employ Unconditional Quantile Regression (UQR), developed by Firpo, Fortin, and Lemieux (2009) to estimate the association between changes in some explanatory variable and quantiles of the unconditional distribution of some outcome variable. Unlike conventional regression approaches that focus on mean effects, UQR allows us to assess how changes in the prevalence of college education are associated with wage outcomes at specific quantiles of the overall distribution. By estimating models at the 25th, 50th, and 75th percentiles for each country and year,⁴ we can infer whether educational wage inequality among women is driven primarily by advantages accruing to college-educated women at the upper end of the wage distribution or by disadvantages experienced by less-educated women at the lower end.⁵

To illustrate what UQR captures in our application, Figure 1 presents simulated data showing the unconditional density of hourly wages together with the densities conditional on having (or not having) a college degree, for two scenarios that differ in the share of women with college education (s). Each conditional density is weighted by the respective group's population share so that their sum equals the unconditional density. Vertical lines indicate the 25th and 75th percentiles.

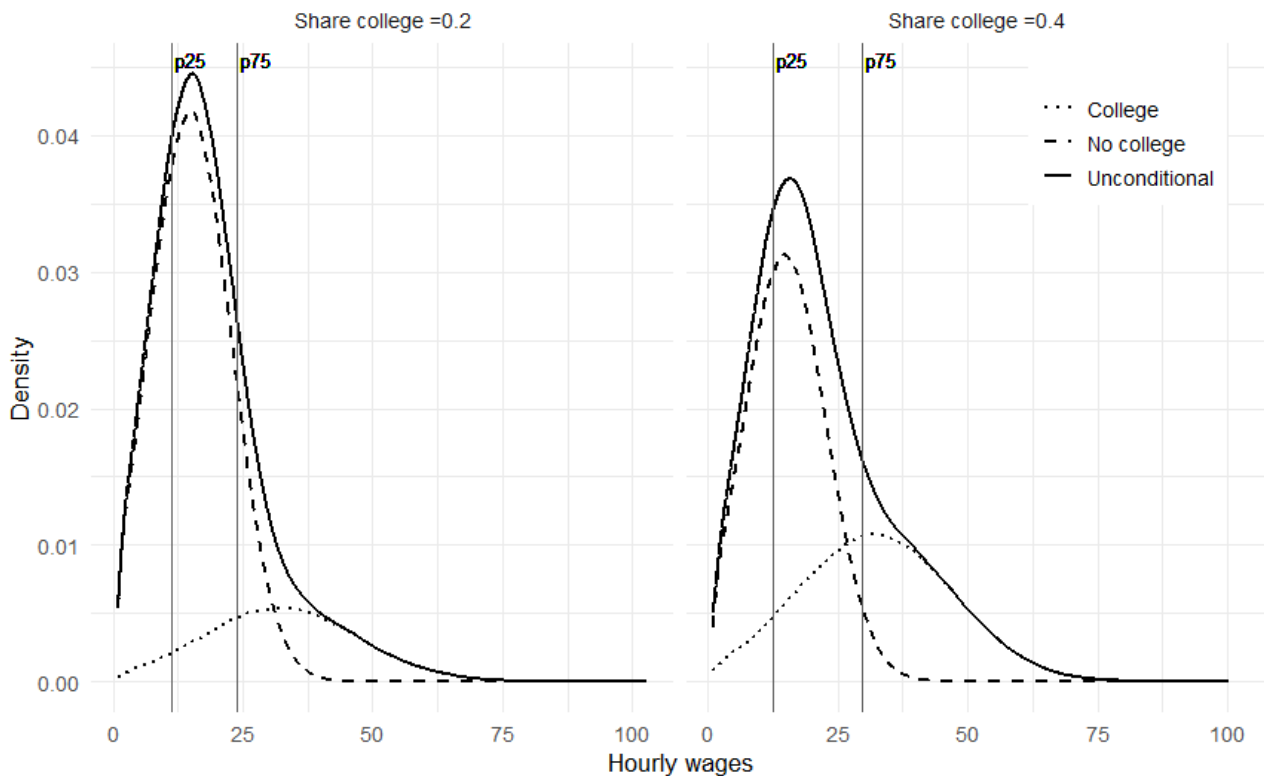
At each point in time, the UQR estimate captures how an increase in s—that is, assigning greater weight to the conditional density of college-educated women while holding its shape constant—

⁴ We conducted UQR calculations using the user-written STATA package `rifhdreg` (Rios-Avila 2020). Statistical inference is based on bootstrapped standard errors, obtained by using the `bootstrap` prefix before the `rifhdreg` command with 1000 repetitions.

⁵ To analyze the extent to which gender-specific education premiums are driven by the top of the wage distribution in the US, Mandel and Rotman (2021) use conditional quantile regression. Conditional quantile regression estimates the association between education and a given quantile of wages while holding other characteristics constant. Consequently, it captures inequality within groups of women who share similar socio-demographic and labor market characteristics. By contrast, if the objective is to understand broader changes in wage inequality at the population level, the focus should be on the unconditional wage distribution. UQR is particularly well suited for this purpose because it estimates how changes in educational attainment are associated with shifts in the overall distribution of wages rather than within narrowly defined subgroups.

changes the shape of the overall wage distribution and, consequently the 25th and 75th percentile. Because wages of college-educated women are typically left-skewed, increasing s from 0.2 to 0.4 in the example raises the 75th percentile. Over time the shape of the conditional wage distribution for college-educated women may itself change, for example by placing even more mass in the upper tail. In this case, the observed association between college education and the 75th percentile would strengthen alongside a widening wage gap, indicating that the gap is increasingly driven by the top of the distribution.

Figure 1: Simulated density plots



By contrast, the wage distribution conditional on no-college education, is typically right-skewed, implying that increasing mass of this group in the unconditional distribution lowers the 25th percentile. If this conditional distribution becomes more right-skewed over time—so that low education increasingly corresponds to very low wages for a larger share of women—we would observe a stronger association between low education and the 25th percentile, suggesting that the wage gap is also driven by developments at the bottom of the wage distribution.

We estimate two model specifications. Both include indicators for college education and low education (defined as not having completed upper secondary education), allowing us to assess the extent to which educational wage inequality reflects the relative advantages of highly educated women at the top of the wage distribution and/or the disadvantages of low-educated women at the

bottom. The first specification includes the same set of socio-demographic controls used in the OLS models estimating educational wage gaps. The second specification additionally incorporates labor market characteristics that are likely to shape the positioning of highly educated and less-educated women within the wage distribution. Specifically, we include indicators for temporary employment, public-sector employment, and employment in managerial or professional occupations. These labor market characteristics are not only potential mediators of the relationship between education and wages but are also substantively important in their own right. Examining their contribution provides deeper insights into the mechanisms that generate and sustain inequalities within the female labor force.

5. The context: inequality and employment

Educational wage gaps should be interpreted within the broader context of overall wage inequality. To this end, Figure A.1.1 in the Appendix presents trends in the Gini coefficient for gross wages in Germany, Sweden, and the United States. The Gini coefficient ranges from zero, indicating perfect equality, to one, indicating perfect inequality. Wage inequality is consistently highest in the United States, where the Gini coefficient remains close to 0.48 throughout the period under study. Sweden exhibits the lowest levels of wage inequality, where the Gini coefficient declined slightly, amounting to 0.38 in 2020. Germany occupies an intermediate position but experienced the most pronounced changes over time. The Gini coefficient increased from approximately 0.38 in 1990 to around 0.43 by the mid-2000s, remained at that level until 2010, and subsequently declined to about 0.40 by 2020.

Table A.1.1 reports descriptive statistics for all variables included in the analysis at selected time points, together with female employment rates by educational group. These data provide a useful overview of changes in women's labor market position across countries and levels of education. Women's educational attainment increased substantially in all three countries over the period under study. By 2020, the proportion of college-educated women had reached 38.5 % in Germany, 43.1 % in Sweden, and 47.4 % in the United States. Despite these marked educational gains, employment rates remained relatively stable within educational groups over time. Among college-educated women, employment rates were consistently high, averaging around 90% across countries. Employment rates among low-educated women were considerably lower and exhibited greater cross-national variation, ranging from 61 % in the United States to 68 % in Germany and 76 % in Sweden.

Differences across countries and educational groups are evident not only in the quantity of employment but also in its quality, and these patterns have evolved over time. Consistent with previous research, part-time employment is most prevalent in Germany, where it increased across all

educational groups during the observation period, and least prevalent in Sweden, where it declined over time. The main exception is women with low levels of education, among whom part-time employment is least common in the United States. Public-sector employment is most widespread in Sweden. Between 1995 and 2001, more than half of all college-educated women were employed in the public sector, compared with only 24.7 % in the United States in 2001. Nevertheless, the importance of public-sector employment declined over time across all countries and educational groups. In the two countries for which data on temporary employment are available, Germany and Sweden, contractual insecurity increased among low-educated women. Between 2000 and 2020, the proportion of low-educated women in temporary employment rose by 8.5 percentage points in Germany, reaching 16.8 %, and by 15.3 percentage points in Sweden, reaching 23.6 %. Finally, Sweden and the United States displayed similarly high shares of college-educated women employed in managerial and professional occupations at the beginning of the observation period (67 % in both countries in 1991, compared with 62 % in Germany). However, their trajectories subsequently diverged. While the share remained broadly stable in the United States, declining only slightly to 66 % by 2020, it increased steadily in Sweden, reaching 71 % by the end of the period.

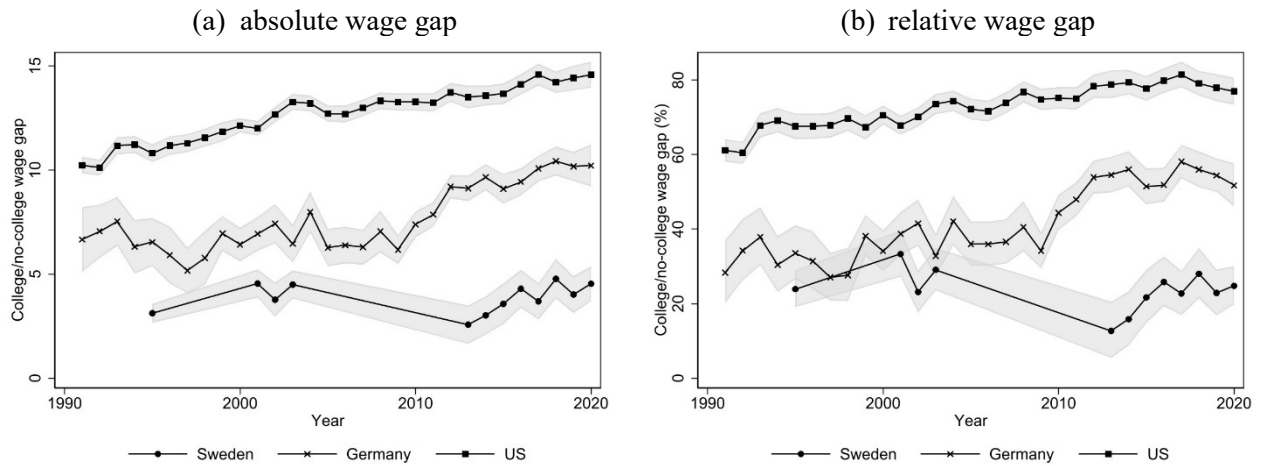
6. Results

Figure 2 presents the absolute (panel a) and relative (panel b) educational wage gaps estimated from OLS regressions for each country and year. The results show that wage gaps are largest in the United States and smallest in Sweden, with Germany occupying an intermediate position.

In the United States, college-educated women earned 10 USD, or 61 %, more than non-college-educated women in 1991. By 2020, this gap had increased to 15 USD, corresponding to 77 %. In the 1990s, educational wage gaps were comparatively smaller in Germany and Sweden, amounting to 7 USD, or 28 %, in Germany in 1991 and 3 USD, or 24 %, in Sweden in 1995. From the early 2000s onward, however, the two countries followed diverging trajectories. This divergence is particularly evident in relative terms: in Sweden, the wage gap declined to 12 % in 2013 before rising again to 5 USD, or 25 %, in 2020. By contrast, after a period of relative stability, Germany experienced a marked increase from 2010 onward, reaching a gap of 10 USD, or 52 %, in 2020.

Overall, educational wage gaps increased in all three countries, but the rise was most pronounced in Germany. Both absolute and relative measures therefore point to similar conclusions regarding overall trends over time and cross-national differences in the level of educational wage inequality.

Figure 2: Education wage gaps among women by country and over time



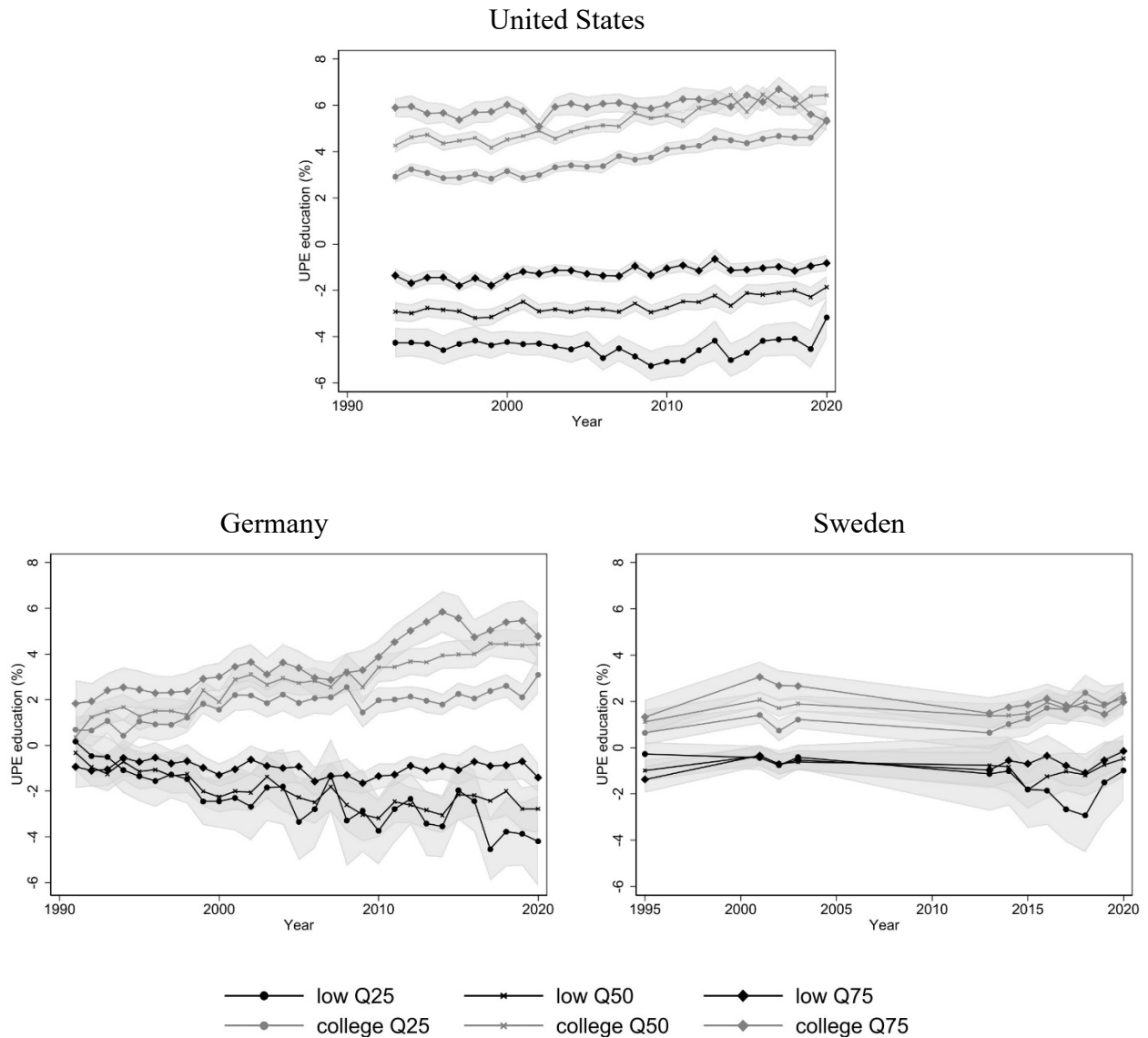
It is important to note that trends in average educational wage gaps may conceal important differences across the wage distribution. Increases in both absolute and relative wage gaps can result from rising wages among college-educated women at the upper end of the distribution, deteriorating wage prospects among less-educated women at the lower end, or a combination of both. To uncover the sources of educational wage inequality among women, we estimate the association between wages and college education, as well as between wages and low education (defined as not having completed upper secondary education), at different points of the unconditional wage distribution using UQR.

Figure 3 presents the results from the specification, including the basic set of controls. The coefficients indicate the percentage change in the value of the 25th, 50th, and 75th percentiles of the wage distribution associated with a ten-percentage-point increase in the share of college-educated or low-educated women at each point in time. This approach allows us to assess whether educational wage inequality is driven primarily by the relative advantages of highly educated women at the top of the distribution, the disadvantages of less-educated women at the bottom, or both.

The results reveal distinct distributional dynamics across the three countries. In the United States, low education is consistently associated with lower wage levels throughout the distribution, but the negative association is strongest at the 25th percentile, indicating that women without upper secondary education are disproportionately concentrated at the bottom of the wage distribution. This pattern remains relatively stable over time. By contrast, the contribution of college education changes substantially. During the 1990s, college-educated women were primarily associated with the upper end of the distribution, but over time their influence extended increasingly to the median and lower-

middle segments. As a result, the association between college education and wage levels strengthened across the distribution, contributing to the widening educational wage gap among women.

Figure 3: Unconditional quantile effects (UQE) – education



In Sweden, educational wage inequality remains comparatively limited throughout the period under study, and changes in the educational composition of the workforce have only modest distributional consequences. The slight increase in educational wage inequality observed in recent years appears to be driven mainly by gains among college-educated women across the wage distribution, combined with a modest deterioration in the relative position of low-educated women at the 25th percentile.

Germany exhibits a different pattern. The sharp increase in educational wage inequality between 2010 and 2015 is associated with growing polarization between college-educated and low-educated women

at opposite ends of the wage distribution. During this period, college-educated women contributed disproportionately to increases in the 75th percentile, while their influence on the median remained more limited. Simultaneously, low-educated women became increasingly concentrated at the bottom of the distribution. Since the 1990s, the association between low education and the value of the 25th percentile has steadily declined, with the pace of decline accelerating after 2000. Together, these developments point to a process of increasing dualization, driven by improvements at the top and deteriorating prospects at the bottom of the female wage distribution.

Figure 4 presents the associations between educational attainment and the 25th and 75th percentiles of the wage distribution, along with labor market characteristics that help explain the positioning of low- and college-educated women at the bottom and top of the distribution. These characteristics include part-time, temporary, public-sector, and managerial or professional employment.

Across all three countries, part-time and temporary employment are associated with lower wage levels, particularly at the 25th percentile, suggesting that these forms of employment contribute to disadvantage at the bottom of the wage distribution. By contrast, employment in managerial and professional occupations is associated with higher wages, especially at the 75th percentile, highlighting its importance for access to the upper end of the wage distribution. Public-sector employment displays a different pattern, being generally associated with higher wage levels at the 25th percentile, while its association with the 75th percentile is less consistent across countries. These associations operate alongside the positive association between college education and wage levels and the negative association between low education and wage levels, providing further insight into the labor market mechanisms that shape educational wage inequality among women.

In the United States, the wage penalties associated with low education, part-time employment, and public-sector employment at the bottom of the wage distribution remain stable over time, as does the wage premium associated with college education at the top. By contrast, managerial and professional occupations became increasingly important in shaping women's position at the 75th percentile after 2000, suggesting that occupational attainment played a growing role in generating advantages at the upper end of the wage distribution.

Germany exhibits a different pattern. While the associations of part-time work, temporary employment, and public-sector employment with the 25th percentile remained relatively stable over time, the relative position of low-educated women at the bottom of the wage distribution deteriorated steadily. College-educated women experienced increasing wage advantages, contributing increasingly to growth at the 75th percentile. By around 2010, the association between college

education and the upper end of the wage distribution had surpassed that of managerial and professional occupations. From that point onward, public-sector employment also displayed a modest positive association with wages at the 75th percentile.

For Sweden, information on public-sector employment is only available up to 2005, although the public sector has historically played a key role in promoting women's labor market integration. In the 1990s, public-sector employment was associated with lower wage levels at the 75th percentile and had no statistically significant association with the 25th percentile. Unlike in Germany and the United States, part-time employment is not linked to a wage penalty. Nevertheless, the growing incidence of temporary employment is increasingly associated with weaker wage outcomes at the bottom of the distribution, indicating that labor market dualization in Sweden is driven less by part-time work than by the expansion of contractual insecurity.

Discussion and conclusion

Previous research has shown that rising female labor force participation has exerted an equalizing influence on household income inequality by increasing women's access to earnings (Nieuwenhuis and Van Lancker 2020). However, the equalizing potential of women's labor market integration may be offset by growing wage disparities among women.

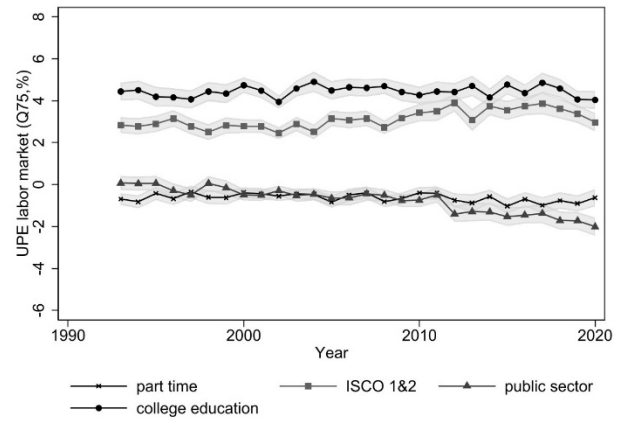
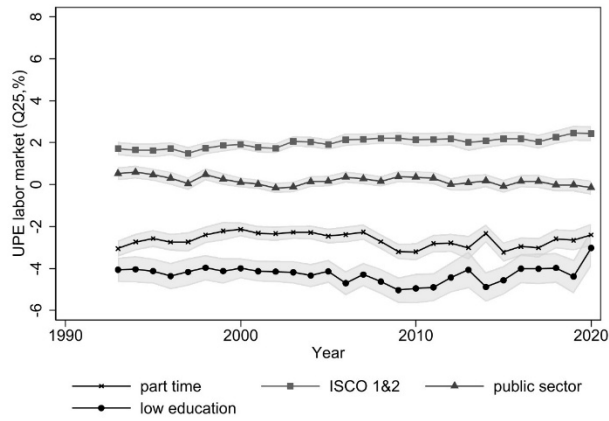
This article advances an emerging research agenda on inequality among women by analyzing how educational wage inequality has developed across countries and over time. Through a comparative examination of the United States, Germany, and Sweden, it extends a literature that has largely focused on single-country experiences. To account for cross-national differences, we propose a framework of women's inequality regimes that brings together labor market and family policy institutions within a common analytical perspective. While these regimes overlap to some extent with Esping-Andersen's (1990) *Three worlds of welfare capitalism*, they are distinguished by their focus on wage inequality among women. Our findings show that these regimes reflect distinct forms of labor market dualization and, consequently, different patterns of wage inequality within the female workforce. _This suggest that the institutional arrangements that enabled women's labor market integration may have simultaneously structured the distribution of economic opportunities and rewards, thereby shaping class inequalities among employed women.

Figure 4: Unconditional quantile effects (UQE) - labor market characteristics

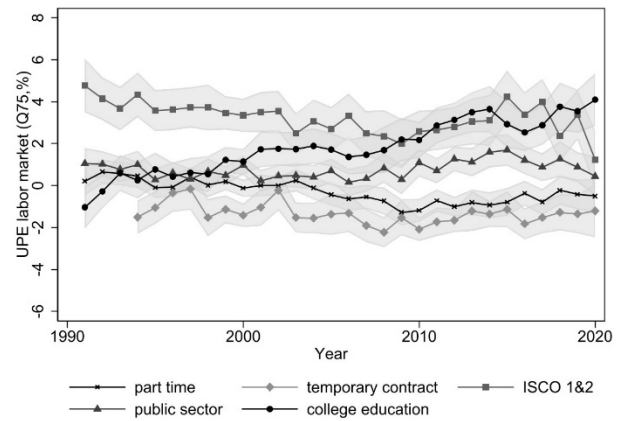
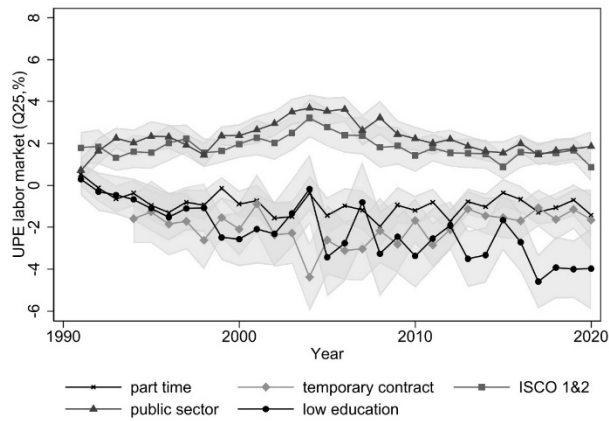
25th percentile

75th percentile

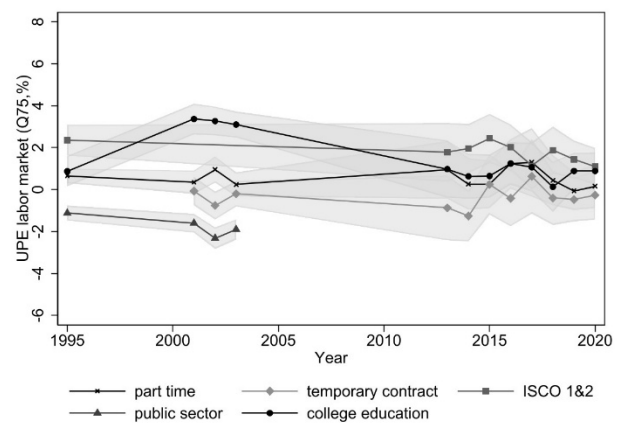
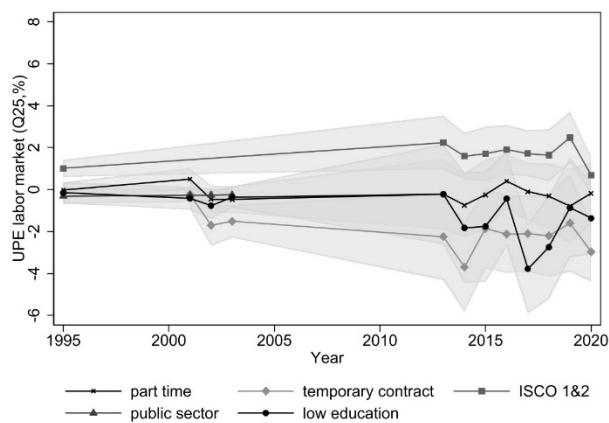
United States



Germany



Sweden



Consistent with our expectations, we find that the wage gap between college- and non-college-educated women is largest in the United States, followed by Germany and Sweden. The U.S. model of liberal women's dualization, in which market-oriented strategies prevail over policies explicitly aimed at promoting gender equality, appears to intensify social stratification among women. This finding resonates with existing evidence showing that highly educated women face comparatively few barriers to entering managerial and professional occupations, while less-educated women encounter greater obstacles to securing stable and well-paid employment. (McCall 2008, 2007; Korpi et al. 2013)

By contrast, the Swedish model of social-democratic women's dualization seems to be the most effective in limiting educational wage inequality among women. This model is characterized by a strong commitment to work–family reconciliation policies that promote gender equality in both paid and unpaid labor, alongside institutional arrangements that support women's employment continuity across educational groups. While the United States and Sweden represent contrasting models with persistently high and low levels of educational wage inequality, respectively, Germany occupies an intermediate position and experienced the most pronounced changes over the period under study. The combination of historically conservative gender norms, the expansion of childcare provision, and increasing labor market flexibilization appears to have contributed to growing class inequalities among women.

Supporting our expectations, we find that women at the top and bottom of the wage distribution contribute relatively equally to educational wage inequality in Sweden. We also find support for the hypothesis that highly educated women at the upper end of the wage distribution play a more important role in explaining educational wage inequality in the United States than in Germany. This pattern is largely confined to the period before the early 2000s. Thereafter, wages among top-earning college-educated women in Germany increased markedly, eventually reaching levels comparable to those observed in the United States. This development suggests that, in the context of broader institutional changes, the expansion of childcare services, has enabled women with college education to strengthen their labor market attachment and gain access to increasingly well-remunerated positions.

Our findings point to important cross-national differences in the mechanisms that generate inequality among women. In the United States, occupational position appears to have become the primary axis of stratification. Within a mature system of educational expansion, growing numbers of highly educated women have gained access to managerial and professional occupations, contributing to the dualization of employment and widening inequalities among employed women. In Germany, by

contrast, educational attainment has become an increasingly important source of stratification, surpassing occupational position in its contribution to wage inequality among women. Although comparatively fewer women enter managerial and professional occupations, the earnings advantage associated with college education has increased substantially, making educational attainment itself a key determinant of inequality within the female workforce.

More broadly, these findings support the argument that deregulated labor markets may facilitate women's labor market integration (Estevez-Abe 2005), but that the benefits of this process are distributed unevenly (McCall and Orloff 2005). To the extent that labor market flexibility primarily expands opportunities for highly skilled women, it may simultaneously reinforce class inequalities among women by increasing the gap between those who are able to capitalize on new opportunities and those who remain concentrated in lower-paid and more insecure forms of employment they also tend to deepen class divisions among women.

Our final expectation that low-educated women at the bottom of the wage distribution would play a larger role in explaining educational wage inequality in the United States than in Germany is not fully supported. Interestingly, since the 1990s, low-educated women in Germany have become increasingly concentrated at the lower end of the wage distribution, approaching a level of relative disadvantage comparable to that observed in the United States. This deterioration intensified after the mid-2000s and may be linked to the unintended consequences of the Hartz reforms, which, although partly intended to increase women's employment, contributed to the expansion of precarious work in Germany (Brady and Biegert 2017) and exerted downward pressure on wages in the lower segment of the labor market (Bradley and Kügler 2019). In contrast to the opportunities that labor market flexibilization appears to have created for highly educated women, these developments point to growing vulnerability among low-skilled women. This interpretation adds weight to the argument that more regulated labor markets are generally better equipped to provide protection and economic security for vulnerable low-skilled female workers (Korpi et al. 2013). The comparatively stronger position of low-educated women in Sweden further supports this view.

Our findings also have important implications for understanding the relationship between women's employment and household income inequality. As educational wage inequality among women increases, the capacity of growing women's employment rates to reduce income inequality across households may become progressively more limited. Rising female educational attainment has strengthened educational and economic assortative mating, with women increasingly partnering with similarly educated and high-earning men (Lam 1997). Consequently, widening wage disparities among women are likely to translate into growing income differences between households. This

dynamic appears particularly pronounced in Germany, where educational wage inequality among women increased more sharply than in either the United States or Sweden between 1991 and 2020.

Our comparative approach indicates that education wage gaps among women can be explored by considering women's inequality regimes that capture the interplay between labor market and family policies. These regimes not only shape women's opportunities to enter and remain in paid employment but also influence how the economic rewards of labor market participation are distributed across educational groups. The findings suggest that institutional arrangements aimed at promoting women's employment should be evaluated not only in terms of their effects on gender equality between women and men, but also in terms of their consequences for class inequalities among women.

At the same time, our study has limitations. To begin, the model specification does not include potentially relevant factors such as immigration status and ethnicity, primarily because comparable measures are not available across all countries and datasets included in the analysis. Moreover, we do not directly examine the mechanisms underlying the observed cross-national differences. Our analysis cannot determine which regime of women's inequality is most effective in facilitating labor market re-entry among college- and non-college-educated women after career interruptions related to family responsibilities or health conditions, nor why this may be the case. Addressing this question would require analyses covering a larger number of countries, which could complement our ideal-typical case selection.

Furthermore, our analytical approach does not allow us to fully disentangle educational wage inequality among women from broader trends in wage inequality. Cross-national differences in educational wage gaps broadly mirror the ranking of overall wage inequality, as measured by the Gini coefficient for gross wages. Yet trends over time diverge from those observed in the Gini coefficient. For example, educational wage gaps have increased in the United States despite relatively stable levels of overall wage inequality and have widened in Germany since the 2000s even though the Gini coefficient has remained largely unchanged. Our findings suggest that investigating educational wage gaps among women captures dynamics that are not entirely reflected in conventional measures of wage inequality. Identifying the mechanisms underlying these processes is an important task for future research. Our work shows that using a gender lens may transform the questions that can be addressed by empirical inequality research.

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Appendix A.1

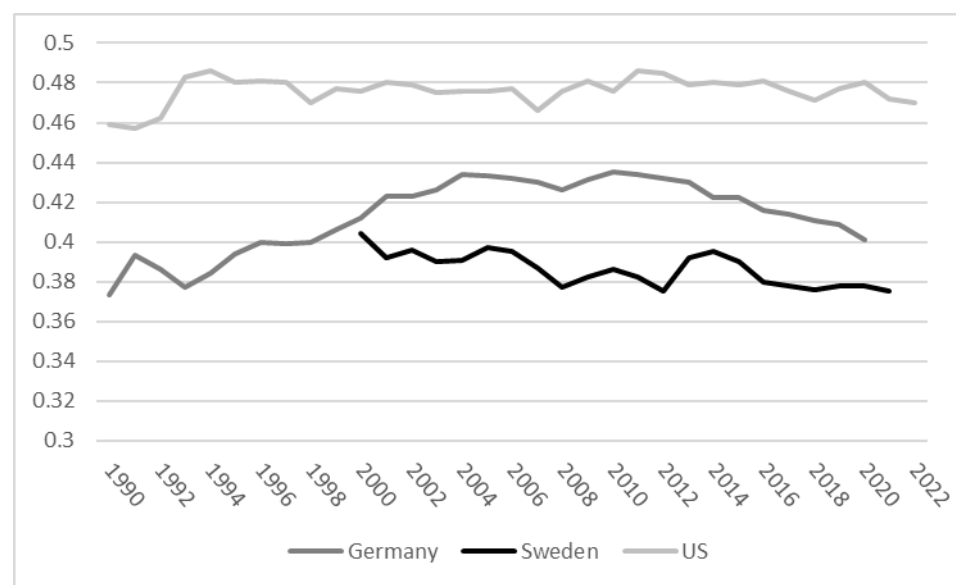
Table A.1: Descriptive statistics

country	year	education (level)	education (%)	wage (mean)	age (mean)	married (%)	children (mean)	migrant (%)	part-time (%)	temporary (%)	public (%)	isco 1&2 (%)	employed (%)
DE	1991	low	14.6	17.7	40.5	77.6	1.5	39.0	26.3		15.2	1.9	67.3
DE	1991	medium	66.0	19.6	39.5	75.2	1.2	9.1	19.4		28.6	6.6	81.7
DE	1991	high	19.4	27.8	39.4	70.8	1.3	5.9	13.3		47.9	65.9	90.1
DE	2000	low	8.8	16.6	40.5	69.7	1.4	40.1	27.3	8.3	18.9	0.5	66.3
DE	2000	medium	68.3	19.7	39.8	67.3	1.1	11.5	25.7	5.3	22.4	6.3	81.8
DE	2000	high	22.9	28.5	39.8	63.8	1.1	10.5	16.9	8.1	36.6	58.5	90.2
DE	2010	low	8.9	15.0	40.1	65.2	1.3	45.4	35.7	14.9	14.5	4.6	67.6
DE	2010	medium	65.4	18.8	41.4	60.3	1.0	14.0	29.6	8.2	22.1	8.5	85.3
DE	2010	high	25.7	28.4	40.2	56.1	1.0	15.1	21.0	8.9	37.7	65.5	90.7
DE	2020	low	10.5	16.2	40.8	51.6	1.3	48.3	36.3	16.8	19.5	3.3	68.2
DE	2020	medium	51.0	22.3	40.8	52.0	1.0	20.9	29.0	6.7	22.1	8.2	87.8
DE	2020	high	38.5	33.3	39.1	57.2	1.0	21.3	21.9	8.5	35.3	59.9	89.9
SE	1995	low	68.8	12.3	40.0	75.0	1.2	3.4	26.7		32.7	3.3	84.5
SE	1995	medium	14.4	14.6	40.4	79.4	1.2	4.6	18.3		23.7	13.0	86.6
SE	1995	high	16.7	17.2	40.7	80.5	1.3	3.6	13.7		60.3	58.4	86.9
SE	2001	low	20.4	14.5	40.8	0.0	1.4	16.3	6.8	12.9	25.0	0.0	75.9
SE	2001	medium	61.6	16.1	39.6	0.0	1.3	10.4	5.7	6.3	24.9	0.0	87.1
SE	2001	high	18.0	20.8	39.9	0.0	1.4	14.6	3.6	9.4	50.1	0.0	91.4
SE	2013	low	16.1	15.4	40.0	43.8	1.4	44.5	18.7	15.6		7.1	71.9
SE	2013	medium	49.3	18.9	41.3	44.4	1.4	10.2	13.2	9.6		13.6	91.0
SE	2013	high	34.6	20.7	39.1	51.4	1.3	19.2	8.3	9.6		72.0	93.6
SE	2020	low	18.8	17.9	39.7	32.8	1.1	48.1	18.0	23.6		5.4	72.7
SE	2020	medium	38.1	20.5	40.8	37.4	1.2	10.9	8.7	7.3		16.4	91.5
SE	2020	high	43.1	24.5	39.6	46.5	1.3	22.3	6.5	7.7		71.0	92.4
US	1991	low	13.7	14.8	39.2	65.6	1.4		15.0		7.9	4.4	60.8
US	1991	medium	58.5	20.1	39.0	69.2	1.3		11.3		17.5	16.2	81.0
US	1991	high	27.8	31.1	39.5	71.6	1.2		9.4		33.5	68.3	89.2
US	2000	low	12.8	14.7	39.5	64.2	1.5	47.0	10.3		5.5	4.7	67.9

Table A1 continued

US	2000	medium	55.2	20.5	40.0	65.2	1.3	11.9	10.1	15.3	19.0	83.0
US	2000	high	32.0	32.5	40.0	72.6	1.2	15.6	8.9	24.7	69.3	88.5
US	2010	low	12.1	14.3	40.0	61.7	1.6	60.3	17.1	5.2	3.4	58.4
US	2010	medium	50.7	20.0	40.4	60.3	1.3	17.5	12.6	14.4	12.0	74.5
US	2010	high	37.2	34.0	39.9	72.1	1.3	18.3	9.4	25.8	65.8	85.4
US	2020	low	9.6	16.6	40.1	56.0	1.7	62.0	14.4	2.7	4.0	57.6
US	2020	medium	43.0	21.7	39.8	54.7	1.2	19.3	10.6	12.3	13.6	70.8
US	2020	high	47.4	36.9	39.5	70.9	1.2	20.3	6.9	23.2	66.3	84.9

Figure A.1.1: Gini (gross wages)



Notes: Aggregate Gross Wages refers to monetary payments received from regular and irregular dependent employment (including cash wage, salary income, overtime pay, employer bonuses, 13th month bonus, profit-share, tips before deduction of income taxes and social contributions. Estimates refer to wage earners aged 16-64 who have non-zero wages. Top and bottom coding has been applied by setting boundaries for extreme values. Data is obtained from <https://dart.lisdatacenter.org/> (20/01/2026)