

# The long way to gender equality: Gender pay differences in Germany, 1871-2016<sup>1</sup>

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## 1 Introduction

Gender pay differences have been the focus of intense academic and policy discussion. Nonetheless, long-run estimates of their evolution in the last two centuries only exist for a handful of countries, such as the US, Sweden, and Britain.<sup>2</sup> This paper constructs a comprehensive long-run times series for Germany since the 1870s. It thus estimates gender equality throughout numerous distinct periods which provided very different environments for working women and the valuation of their work from the period of high industrialization through two wars until present-day reunified Germany. The main question guiding this investigation is: What were the long-run developments in women's education, work experience and occupations that have led to the observed changes in the gender pay ratio?

## 2 Data and Method

Most previous studies on Germany either focus on specific time periods (Gómez-León and de Jong, 2019; Gärtner, 2014) or specific occupational groups such as only blue-collar workers or white-collar workers (Bajohr, 1979). Starting with the emergence of detailed microdata since the 1970s, most research on gender inequality relies on this source (among others Fitzenberger and Wunderlich, 2002; Kunze, 2005).

For my analysis, I combine published data for the three main occupational groups of the German employed workforce: (1) blue-collar workers in agriculture, (2) blue-collar industrial workers, and (3) white-collar workers in industry and commerce. Taking into account the occupational composition of the labour force, I arrive at a representative estimate of the gender pay ratio for the employed workforce. For each of the three groups, I draw on a rich set of historical data assembled from numerous sources specified in table A.1. My sample is restricted to the employed workforce outside the house and in the private sector. I do not include assisting family members nor civil servants. For the post-war period until reunification, the analysis is restricted to the Federal Republic of Germany.

First, I calculate average hourly earnings for men and women in each of the three groups. Thereafter, I weight the mean earnings by the share of employed in each gender-occupation group using census data. Thus, I arrive at the value of average gross earnings of men and women, respectively, for the whole sample population (foll. Gómez-León and de Jong, 2019).

Last, I compute the cross-occupation gender pay ratio as follows:

$$\text{Gender pay ratio} = \frac{\text{Women's gross hourly earnings}}{\text{Men's gross hourly earnings}} \quad (1)$$

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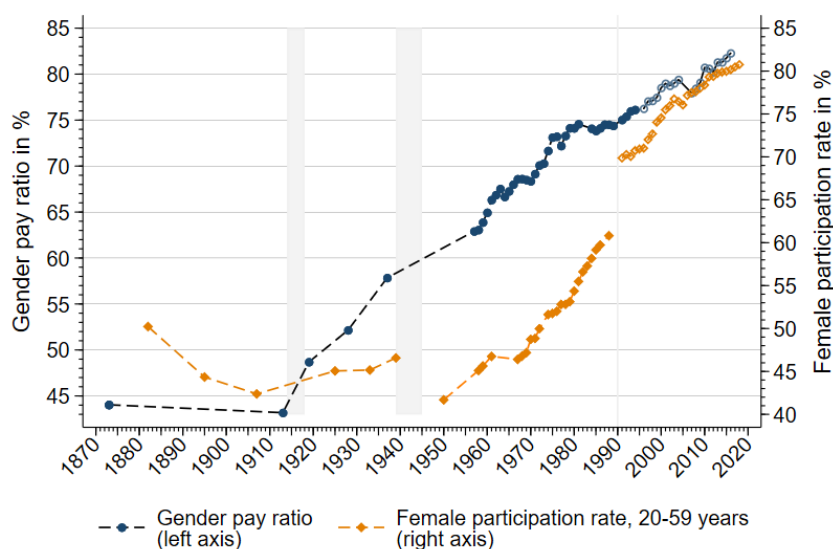
<sup>1</sup> I thank Klaus Harney for providing the data on vocational schooling before 1945, and Lotte Maaßen for her excellent research assistance.

<sup>2</sup> For the US, see Goldin (1990), and Blau and Winkler (2018), for Sweden Stanfors (2003), and Svensson (2003), and for the England, Humphries and Weisdorf (2015), and Burnette (2008) for Britain.

While many studies discuss tariff wages (e.g. Bajohr, 1979), this study focuses on actual gross earnings. Tariff minimum wages can give a good overview of institutionalized differences in pay. However, employers had substantial liberty to go beyond these benchmarks such that the gender pay ratio of actual earnings can draw a different and more precise picture. Actual gross earnings include wages or salaries, including the employee's share of social insurance contributions and social and other supplements paid by employers. I add in-kind payments to agricultural workers' pay to make it comparable to industrial workers' earnings.

### 3 The gender pay ratio between 1871 and 2016: Giant leaps and stagnation

The development of the gender pay ratio shows alternating periods of stagnation and dynamic movements since the Proclamation of the German Empire. While the period of high industrialization shows stagnation in the female labour force participation as well as the pay ratio, the first half of the twentieth century exhibits giant leaps towards pay equality. Between 1913 and 1937, the gender pay ratio increased from 43 per cent to 58 per cent. Slower growth characterizes the post-war period. The post-reunification period, despite rapid economic changes, did not bring another significant shift.



**Figure 1:** Gender earnings ratio and female labour force participation rate. Gender pay ratio for reunified Germany since 1995 (hollow items).

In the next section, I explore two possible driving factors of the observed developments in the gender pay ratio in Germany: First, the role of increased vocational education of women before 1945; and second, the role of women's occupational change.

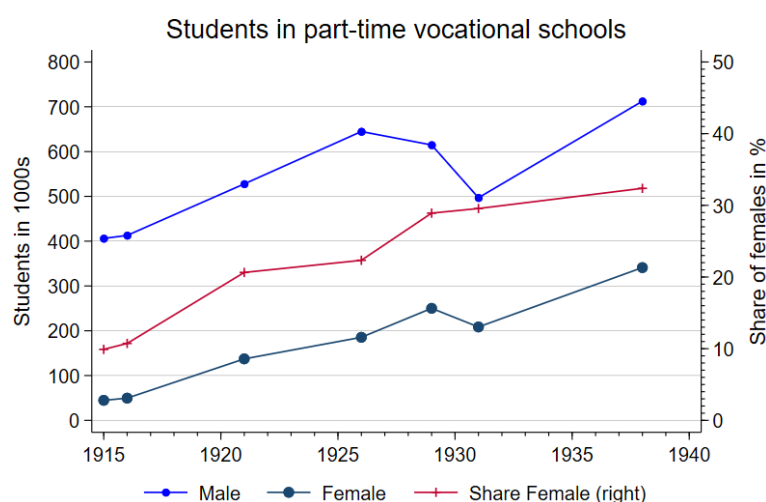
## 4 Potential drivers

### 4.1. Educational expansion: Female empowerment in two waves

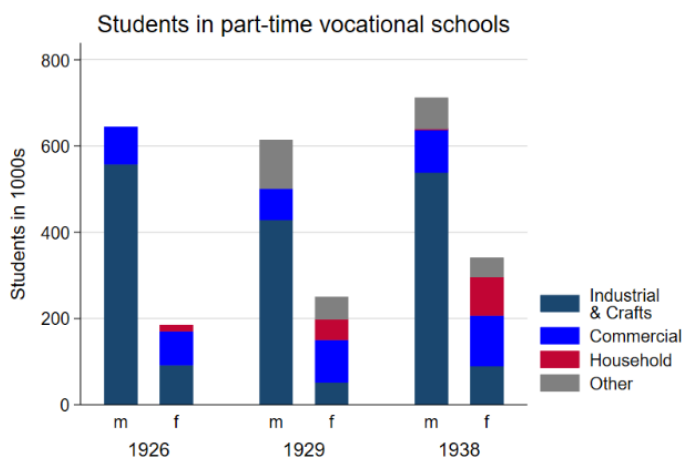
The educational expansion for women and its effects on the gender pay ratio took place in two waves in Germany. Reason for this is the bifocality of the school system. Since the mid-nineteenth century, a vocational school system evolved parallel to the general secondary education track. Vocational schools had the aim to transmit occupation-specific knowledge in commercial and industrial tracks. While in the first half of the twentieth century, vocational schooling was the main driver of building a skilled labour force, only in the post-war period high-school education and increased tertiary education became more important for gender pay equality.

The most common way of becoming a skilled worker in the first half of the twentieth century was through an apprenticeship which often was accompanied by attendance of a part-time vocational school (Mayer 1999, 40). However, only very few young women could access this track, possibly because employers saw them as transient workers that dropped out of the labour force upon marriage. As a substitute to this male-dominated path, full-time vocational schools for women mainly focused on commercial education or housekeeping tasks emerged since 1900. The number of these schools and students increased over the 1910s and 1920s. Young women constituted the majority in this track of full-time vocational training. Nonetheless, these schools were until 1938 still marginal compared to part-time vocational schools (Herrmann 2006, figure 3).<sup>3</sup>

Changes in the trade regulations before the First World War, as well as the Weimar Constitution of 1919, and the Reich School Conference of 1920 contributed to an increase of women's numbers and their share in the formerly male-dominated part-time vocational schools (figure 2a). While women were catching up in numbers with male students, a segregation concerning the schooling content remained. While young men dominated industrial vocational schools, young women took in the majority a commercial track or a household track solely installed for females (figure 2b).



**Figure 2a:** Number of students and female share in part-time vocational schools, 1915-38.

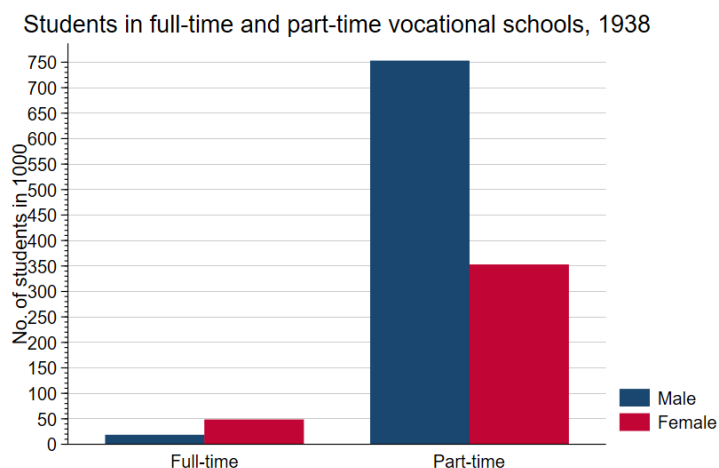


**Figure 2b:** Composition of schooling content for female (f) and male (m) students in part-time vocational schools. Source: Herrmann et al. (2021), and Herrmann (2006).

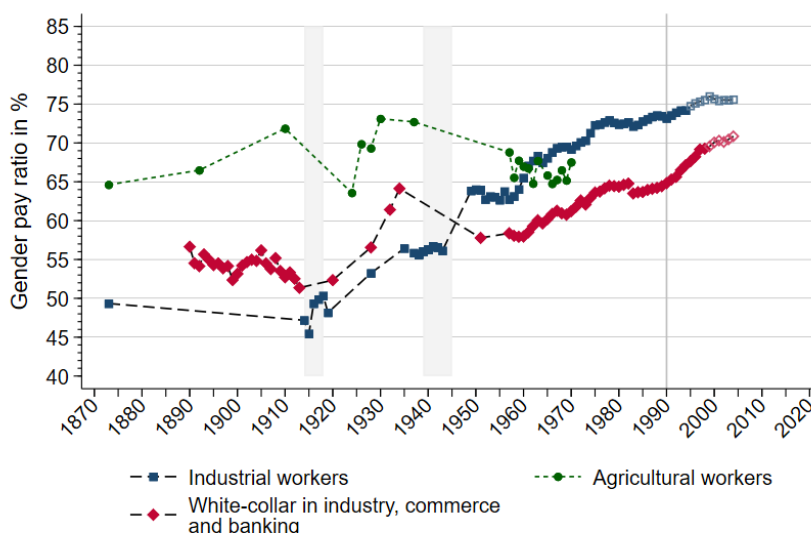
In 1938, young women were dominating the still marginal full-time commercial schools and had increased their share in the part-time vocational schools to 31 per cent (figure 3). These developments

<sup>3</sup> Figures 2 and 3 show only numbers for Prussia, the biggest and dominating state of the German Empire, concerning the regulation of vocational training since 1871.

might have contributed to the observed increases in the gender pay ratio visible for blue-collar, but especially for white-collar workers in the interwar period (figure 4).



**Figure 3:** Students in full-time, and part-time vocational schools, 1938. Sources: Herrmann et al. (2021) and Herrmann (2006).

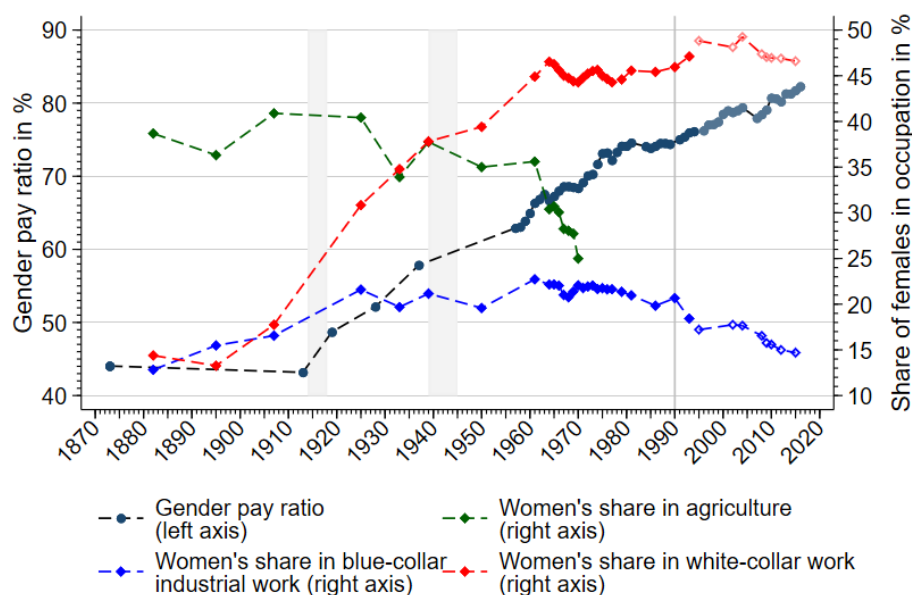


**Figure 4:** Gender pay ratios within sector-occupation groups 1870s-2016.

#### 4.2. Sectoral, and occupational change enhanced the gender pay ratio in the first half of the twentieth century

While within-sector pay ratios developed very differently, the overall trend has been increasing throughout the twentieth century. One potent lever for this development is the migration of women workers from low-pay occupations, especially agriculture, to higher-pay jobs in blue- and white-collar work.

Figure 5 relates the share of women among all workers in agriculture, blue-collar industrial work, and white-collar work respectively with the development of the gender pay ratio. Women moved out of agriculture at an increasing pace since the beginning of the twentieth century. The women's share in blue-collar work already peaked in the interwar period and never exceeded 23 per cent. The most dominant movement is the rapidly increasing share of women in white-collar work from 1895 to the 1960s. In white-collar work, young women found more socially acceptable jobs. On top, the wider access to commercial vocational schooling for young women since 1900 gave them the opportunity to increase their skill level and thus their pay in this occupation.



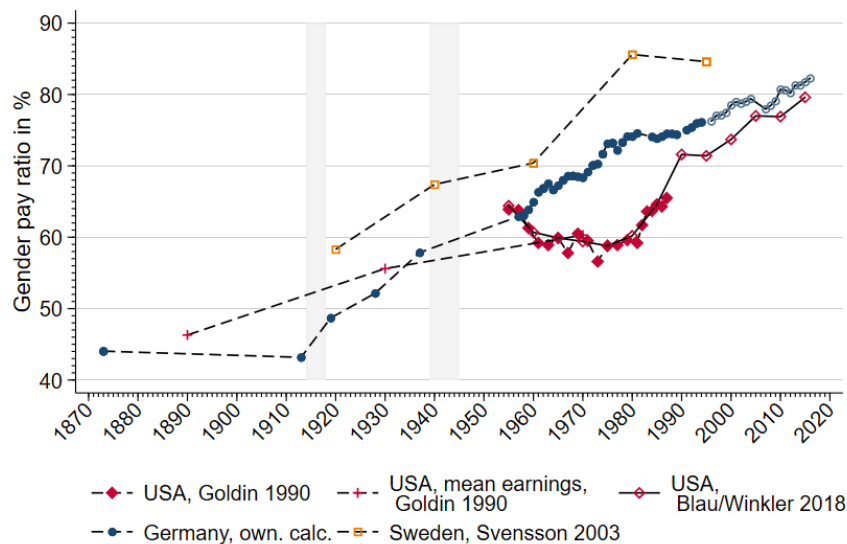
**Figure 5:** Sectoral change of women based on Müller et al., (1983), Statistik des deutschen Reichs, Stat. Jahrbuch für die Bundesrepublik Deutschland, and Fachserie 1 Reihe 4.1.1. by the Statistical Office of Germany.

## 5 International comparison

Comparing the German case to the Swedish (Svensson, 2003) and US-American (Goldin, 1990; Blau and Winkler, 2018) experience uncovers similarities in developments and levers before 1945 and quite substantial divergences in the post-war period.

In all three countries, the gender pay ratio rose substantially between 1890 and 1940. Despite slightly different timings, this leap towards pay equality can be generally connected to a substantial entry of young women into better-paid white-collar and service jobs propelled by a broader access of young women to secondary education. In the German case, vocational training instead of general secondary education was the main educational channel.

The post-war period shows significant dissimilarities between the US-American and the European experience. In the US, gender pay differences stagnated until the 1980s when women overtook men in college completion rates, entered the labour market as high-skilled employees and increased the gender pay ratio substantially (Goldin et al., 2006). In Germany and Sweden, the upward trend of the gender pay ratio already started in the early 1960s and stagnated after 1980. However, also between Sweden and Germany, the gender pay ratios diverged in the post-war period. As possible drivers for Sweden's soaring gender pay ratio, Gärtner (2014) discusses an increasing social acceptance towards working mothers and Svensson (2003) points out taxation and industrial policies that brought more women into well-paid blue-collar work. In both aspects, Germany took different paths: Gender norms concerning stay-at-home mothers were strong until recently (Gärtner, 2014). Further, Germany filled its excess demand for industrial labour through several guest-worker programmes. These different approaches may have contributed to the divergence in the gender pay ratios of the two countries.



**Figure 6:** Comparison between the average gender pay ratios for Germany, and Sweden, and the median gender pay ratio for the USA. Goldin (1990) for 1890,1930, and 1970: weighted average of six occupational groups.

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Table A.1: Sources.

<b>Period</b>	<b>Sources</b>
Before World War I	Agriculture: von der Goltz (1875), Asmis (1919). Blue-collar industry: Reichskanzler-Amt (1877); Kuczynski, (1962, & 1963), Bry (1960), Desai (1968), Hohls (1991). White-collar: Hohls (1991), Stat. Reichsamt (1921).
World War I	Blue-collar industry: Reichsarbeitsministerium u. vom Generalbevollmächtigten für den Arbeitseinsatz (1918-1920): Reichsarbeitsblatt.
Weimar Republic	Agriculture: Deutscher Landarbeiter-Verband (1926), and following publications; Baldauf (1932). Blue-collar industry: Stat. Reichsamt (1928-1932): Wirtschaft und Statistik; Stat. Reichsamt (1930-1932): Statistisches Jahrbuch für das Deutsche Reich. White-collar: Stat. Reichsamt (1921): Statistik des deutschen Reichs, Vol. 293; 1920; Glaß and Kische (1930); Suhr (1930); GdA (1931).
‘Third Reich’	Agriculture: Statistisches Reichsamt (1941): Wirtschaft und Statistik. Blue-collar: Stat. Reichsamt (1935-1943): Wirtschaft und Statistik. White-collar: Stat. Reichsamt (1939), Statistik des deutschen Reichs, Vol. 530.
Post-war period (Federal Republic)	Agriculture: Statistisches Bundesamt (1958) and following: Gehalts- und Lohnstrukturerhebung. Blue- and white-collar: Stat. Bundesamt (1957-1990): Statistisches Jahrbuch für die Bundesrepublik Deutschland: Verdienststrukturerhebung.
Reunified Germany	Statistisches Bundesamt (1992) and following.