DIW Weekly Report 10 2020

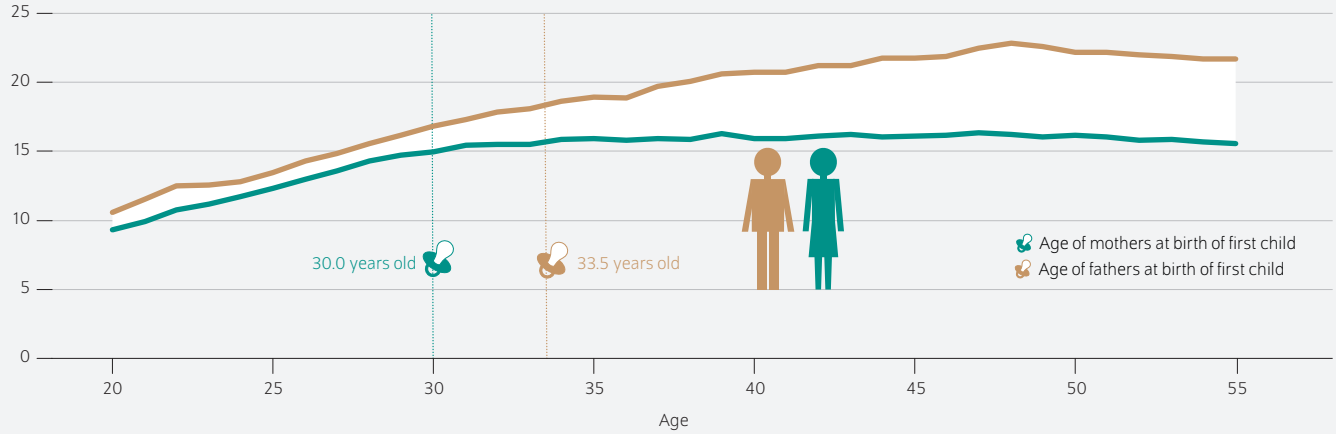
AT A GLANCE

The gender pay gap begins to increase sharply at age 30

By Annekatrin Schrenker and Aline Zucco

- The gender pay gap for employees under 30 and over 50 is nine percent and 28 percent, respectively
- The gender pay gap increases beginning at age 30, the same time women reduce their working hours significantly in contrast to men
- Lower hourly wages and fewer career advancement opportunities in part-time work contribute to the pay gap
- New work structures, such as job sharing, could improve the value of part-time work and work life balance
- More parental leave allowance for fathers, more all-day schooling, and individual instead of joint taxation (*Ehegattensplitting*) could also help

The gender pay gap begins to increase at age 30 – average wage for women stagnates after the birth of the first child
Gross hourly wage in euros



Source: Authors' own calculation based on the Structure of Earnings Study 2014 and the Microcensus 2014–2016.

FROM THE AUTHORS

"Policies must create incentives to converge the weekly hours worked by women and men. This would also reduce the gender pay gap."

— Annekatrin Schrenker —

MEDIA

Audio Interview with K. Wrohlich
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The gender pay gap begins to increase sharply at age of 30

By Annekatrin Schrenker and Aline Zucco

ABSTRACT

The gender pay gap increases with age: While the average gross hourly wage gap between male and female 30-year-olds is nine percent, the gap triples to 28 percent by the age of 50. This stark increase is due to differences in employment behavior in the decades between the ages of 30 and 50. Beginning at age 30, women often switch to part-time work to be able to provide childcare, whereas men tend to increase the number of working hours at the same age. Because part-time work is, on average, paid more poorly per hour and part-time workers less frequently hold leadership positions, the average wages of women between 30 and 50 years of age remain virtually constant. In contrast, the average wages per hour for men continue to increase with age. Measures focusing on improving work-life balance must be taken to combat this pay gap. Such measures include restructuring work environments by allowing two part-time employees to share one executive position and increasing the amount of months of parental leave earmarked to one partner.

In light of International Women's Day on March 8, this report investigates gender inequality in the workplace. On average, women earn 21 percent less than men.[1] Such an established wage gap results in a mindset that it is fair to pay women lower wages,[2] and women themselves even expect lower wages.[3] The difference in the average gross hourly wage between men and women is also referred to as the unadjusted gender pay gap.[4]

The pay gap results from the fact that women work in occupations[5] and at firms[6] with lower wage levels and are less often represented in executive positions than men are.[7] The institutional context also plays a role: For example, the gender pay gap varies depending on the region[8] as well as between occupations with lower and with higher collective bargaining coverage.[9]

1 Statistisches Bundesamt, "Verdienstunterscheid zwischen Frauen und Männern 2018 unverändert bei 21 Prozent," press release no. 0098, March 14, 2019 (in German; available online)

2 Jule Adriaans, Irakli Sauer, and Katharina Wrohlich, "Gender Pay Gap in den Köpfen: Männer und Frauen bewerten niedrigere Löhne für Frauen als gerecht" *DIW Wochenbericht*, no. 10 (2020): 147–155 (in German; available online).

3 Christoph Breunig, Iuliia Grabova, Peter Haan, Felix Weinhardt, and Georg Weizsäcker, "Gender Gap in Lohnerwartungen," *DIW Wochenbericht*, no. 10 (2020): 153–158 (in German; available online).

4 Unless otherwise noted, the terms "wage gap," "earnings gap," and "earnings difference/difference in earnings" refer to the unadjusted gender pay gap in this report. The literature differentiates between the unadjusted and adjusted gender pay gaps. Please see the DIW Berlin glossary entry (in German only; available online) on "gender pay gap" for more information on the different definitions of the gender pay gap.

5 Katharina Wrohlich and Aline Zucco, "Gender Pay Gap Varies Greatly by Occupation," *DIW Economic Bulletin*, no. 43 (2017): 429–435 (available online).

6 Claudia Finke, Florian Dumpert, and Martin Beck, "Verdienstunterschiede zwischen Männern und Frauen," *WISTA: Wirtschaft und Statistik*, no. 2 (2017): 43–62 (in German); Corinna Frodermann, Alexandra Schmucker, and Dana Müller, "Entgeltgleichheit zwischen Frauen und Männern in mittleren und großen Betrieben," *IAB Forschungsbericht*, no. 3 (2018) (in German; available online).

7 This correlation is also called the "gender leadership gap," see the DIW Berlin glossary entry on the term (in German only; available online) for more information.

8 Michaela Fuchs, Anja Rossen, Antje Weyh, and Gabriele Wydra-Somaggio, "Unterschiede in der Lohnlücke erklären sich vor allem durch die Betriebslandschaft vor Ort," *IAB-Kurzbericht*, no. 10 (2019) (in German; available online.)

9 Aline Zucco, "Strong Correlation between Large Gender Pay Gaps and Non-Linear Pay in Certain Occupations," *DIW Weekly Report*, no. 10 (2019): 77–86 (available online).

DOI: https://doi.org/10.18723/diw_dwr:2020-10-1

Box 1

Data: Structure of Earnings Study

The analysis is based on data from the Structure of Earnings Study (Verdienststrukturerhebung, SES) for 2014. The SES is a linked employer-employee dataset that is collected every four years by the Federal Statistical Office. The data includes information on employees (gross pay, number of hours worked, gender, and education) and employers (company size, private or public sector) as well as information on the occupation (occupational position, shift work, or overtime). The data includes employees working main and side jobs but no self-employed persons. Overall, the final 2014 wave includes data on over a million employees in over 60,000 companies.

Using the SES, the gender and age-specific gross hourly wage is calculated. This is the quotient of the gross monthly wage and the weekly hours worked multiplied by 4.3. The gender pay gap is the relative difference between the hourly wages of men and women. The proportion of part-time workers stated in this report is based on information provided by the employer and refers to a deviation from the standard full-time workweek of the firm.

Microcensus

To calculate the age of parents at the time of the birth of their first child, Microcensus waves from 2014 to 2016 were used. These figures indicate the age of the mothers and fathers who had their first child in 2014. The Microcensus is an annual household survey of over 800,000 individuals in over 350,000 households. Thus, this cross-sectional data set covers just under one percent of the German population.

Socio-Economic Panel

Data from the Socio-Economic Panel (SOEP) was used to calculate the wage development of employees with and without children. The SOEP surveys the same individuals on an annual basis; this makes it possible to track which women never have children. The calculations include employed women and men between 25 and 40 (not including freelancers) years old. The analysis is based on the survey waves 2014–2017, whereby the hourly wages of all years were converted into 2014 prices using the consumer price index for comparison purposes. In addition, the SOEP weighting factors were used to make representative statements for the entire population.

Box 2

Methodology: Age effects vs. cohort effects

The data from the Structure of Earnings Study does not make it possible to differentiate between age and cohort effects in the present analysis. This means that in this analysis, the differences between younger and older workers are due to two effects: age-related behavioral changes and differences in the composition of younger and older birth cohorts. Due to the *Bildungsexpansion* (a strong expansion of secondary and tertiary education) that began in West Germany in the 1950s, younger cohorts have, on average, higher levels of education and thus earn higher incomes. Since women benefit from this expansion more than men do, younger birth cohorts differ less in their level of education on average than older birth cohorts do. In addition to unequal employment histories, these cohort effects also contribute to differences in the gender pay gap across different age groups.

Women and men have different employment histories

Above all, however, employment history explains the pay gap. On average, women take longer breaks from work when they have children and, work part-time more often.[10] This poses the question of to what extent the professional lives of women and men are related to having children, and whether this is accompanied by a change in the gender pay gap as women and men age. Therefore, in this study, the gender pay gap is analyzed using data from the Structure of Earnings Study (*Verdienststrukturerhebung*) (Box 1) for various age groups. In addition, possible determinants, such as part-time work, which is more widespread among women, are analyzed in this context. Cohort effects play a role as well (Box 2). The present analysis does not differentiate between age and cohort effects so that both effects always play a role when comparing younger and older employees.

Gender pay gap increases starting at 30, especially in western Germany

When viewing the development of the gender pay gap over time, it becomes apparent that the gap is not constant; rather, it increases with age (Figure 1). The wage gap in Germany for 25 to 30 year olds is around nine percent and it increases continually until age 49. By 49, the gap has tripled to and remains at 28 percent. This trend in Germany is particularly pronounced in western Germany. While the gender pay gap increases with age in eastern Germany as well, the increase is more moderate. The wage gap for those under 20 begins at six percent, rises to 15 percent by age 42, and then stabilizes at 12 percent. However, this still represents a doubling of the gender pay gap between the ages of 25 and 55.

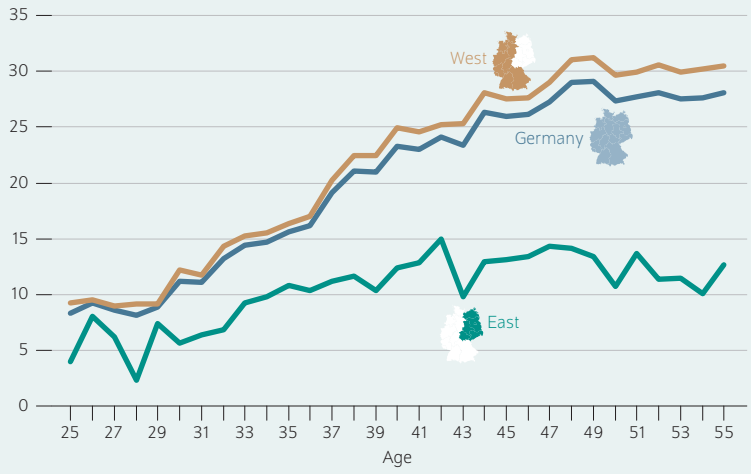
Differences in the development of hourly wages for men and women

It is helpful to view the hourly wage development for women and men separately to understand why the wage gap increases with age (Figure 2). For Germany as a whole, it can be seen that the sharp rise in the gender pay gap over time is because men and women's wages develop differently beginning at the age of 30. While both men and women between 25 and

10 Finke, Dumpert, and Beck, "Verdienstunterschiede zwischen Männern und Frauen."

Figure 1

Gender pay gap across age
In percent



Note: The estimation is based on employees. Weighted values.

Source: Authors' own calculation based on the Structure of Earnings Study.

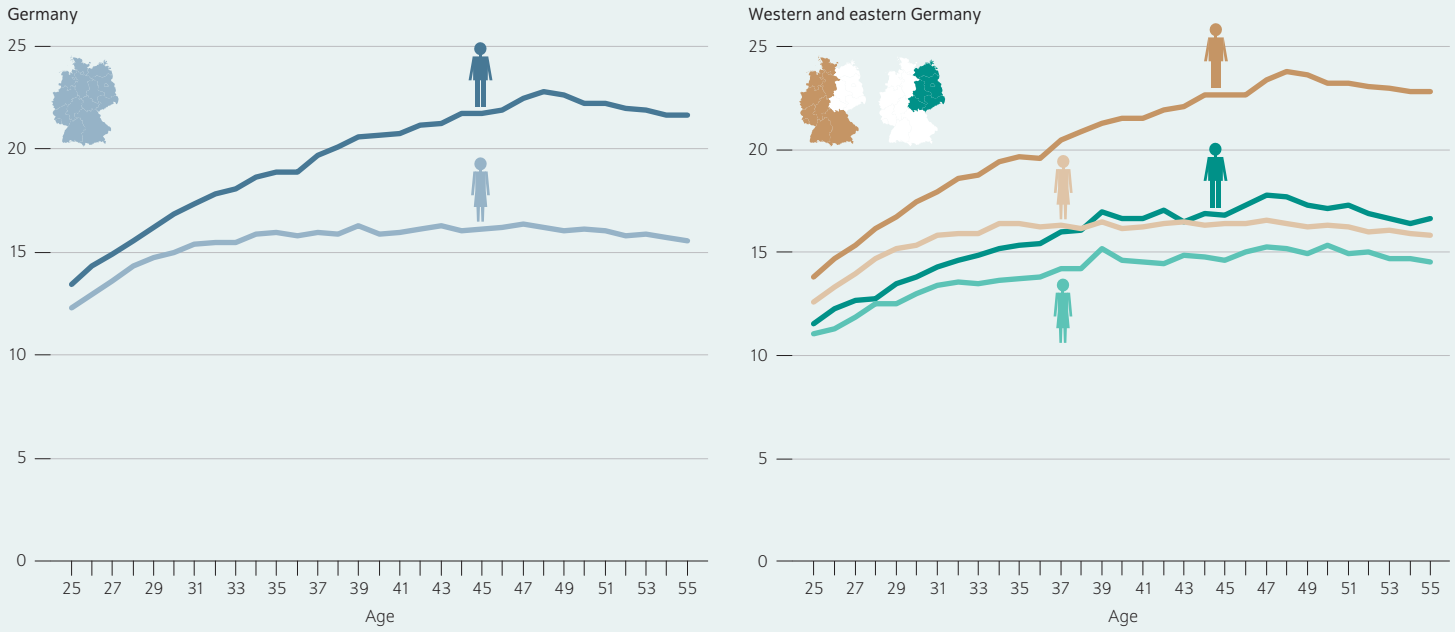
The gender pay gap increases in (western) Germany with age.

30 experience similar wage increases, this changes from the age of 30 onwards. Men's wages continue to increase until the age of 49, where they reach an average of 23 euros per hour, corresponding to an annual wage increase of about 1.8 percent. In contrast, the average wage for women between the ages of 30 and 49 remains constant between 15 and 16 euros, with an annual increase of only 0.4 percent. When only considering western Germany, the situation is similar. In contrast, in eastern Germany, the wages of men and women over time develop at a similar pace. Thus, the increase in the gender pay gap as employees age in (western) Germany is essentially attributable to two factors. First, the sharp rise in male wages and, secondly, the almost constant level of female wages. The findings of the present analysis confirm the conclusions of a recent study that shows the gender pay gap is primarily very pronounced in economically strong western German regions with high male wages and relatively small in regions with lower male wages.[11]

11 Michaela Fuchs, Anja Rossen, Antje Weyh, Gabriele Wydra-Somaggio, "Why do women earn more than men in some regions? Explaining regional differences in the gender pay gap in Germany," *IAB Discussion Paper*, no. 11 (2019); Fuchs et al., "Unterschiede in der Lohnlücke."

Figure 2

Average hourly wage of men and women across age
In euros



Note: The estimation is based on employees. Weighted values.

Source: Authors' own calculation based on the Structure of Earnings Study 2014.

Beginning at the age of 30, the female wage level remains constant in (western) Germany.

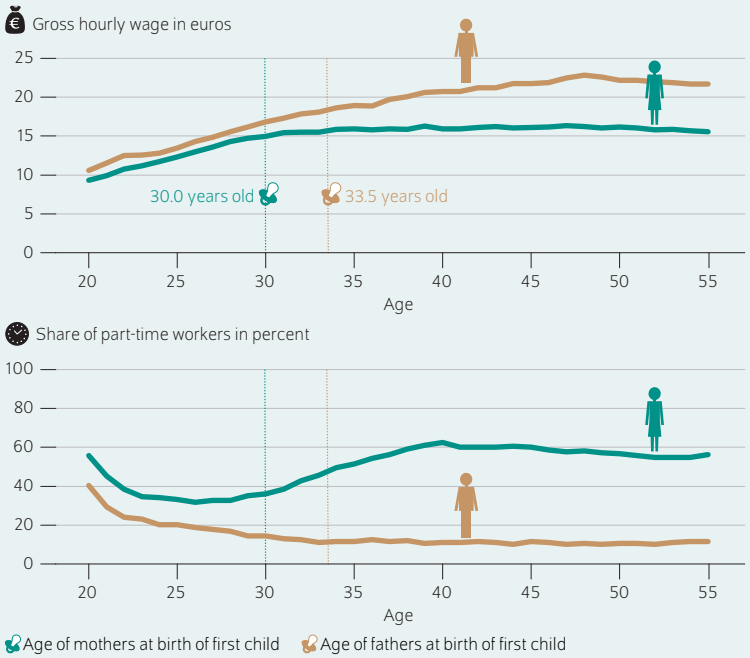
Proportion of women working part-time increases significantly around the time of the birth of the first child

The divergence in wage development for men and women starting at age 30 is due to, among other things, the unequal amount of hours worked per week (Figure 3). It is first apparent that women are much more likely to work part-time at a young age than men are,[12] but the differences in employment behavior become much more pronounced at around age 30. For example, almost 20 percent of men between the ages of 25 and 27 work part-time, whereas 30 percent of women in the same age group work part-time. While men tend to increase their working hours, with 90 percent of them working full-time by age 40, the reverse holds for women. Around age 30, the share of women working part-time increases continually. By the age of 40, 62 percent are working part-time and 38 percent full-time. This stark divergence in employment between men and women coincides approximately with the birth of the first child. On average, women are 30 years old at the time of the birth of their first child. This roughly corresponds to the point when both the wage trend for women noticeably flattens out and women increasingly begin to work part-time. There is no such observable correlation for fathers. Notwithstanding the fact that men become fathers at an older age than women do (on average for the first time at the age of 33.5), this does not seem to have any noticeable effect on their employment behavior or wage development.

When viewing the trend of part-time work around the birth of the first child separately for eastern and western Germany, two findings are evident (Figure 4). First, in both parts of the country, women are the ones who tend to reduce their working hours when beginning a family. The share of men in their mid-30s working part-time remains almost constant nationwide, but the share of women clearly increases: by 35, over half of all women in the east (54 percent) and west (51 percent) are working part-time. Second, the share of women in western Germany working part-time remains constant over the second half of their lives, while in eastern Germany, the trend reverses. For example, the share of 35- to 40-year-old women working part-time in western Germany peaks at 64 percent before falling back to and remaining at 60 percent. In contrast, the share of women up to age 40 working part-time in eastern Germany remains constant at 54 percent before beginning to decrease. Almost 60 percent of all 50-year-old women work full-time in eastern Germany. These results suggest that, in addition to regional differences in the increase in male wages, the different employment behavior of women in the old and new federal states[13] also contributes to the fact that the gender pay gap in eastern Germany increases less with age than in western Germany.

Figure 3

Average hourly wage, share of part-time workers, and average age at the birth of the first child



Note: The estimation is based on employees. Weighted values.

Source: Authors' own calculation based on the Structure of Earnings Study 2014 and the microcensus 2014–2016.

The consistency of the female wage level beginning at age 30 correlates with the birth of the first child.

Non-mothers working full time have similar wage profiles as men

Does a family-related reduction of working hours actually lead to lower wage growth for women? The wage profiles of non-mothers working full-time can be used to investigate this question, as they differ least from men in their employment histories (Figure 5). It can be observed that the wages of women who do not begin a family and switch to part-time work between the ages of 25 and 40 are almost identical to the wages of men. This suggests that differences in wage growth between men and women are at least partially due to a larger share of women working part-time. Indeed, previous DIW Berlin studies have documented a pay gap between part-time and full-time workers.[14] The average hourly pay gap between full-time and part-time female employees was around 17 percent in 2017. However, non-mothers who work full-time can only be included as a comparison group to a limited extent, as selection effects also play a role. That means that women with especially high earnings prospects are also more likely to not have children; for instance, they may purposefully

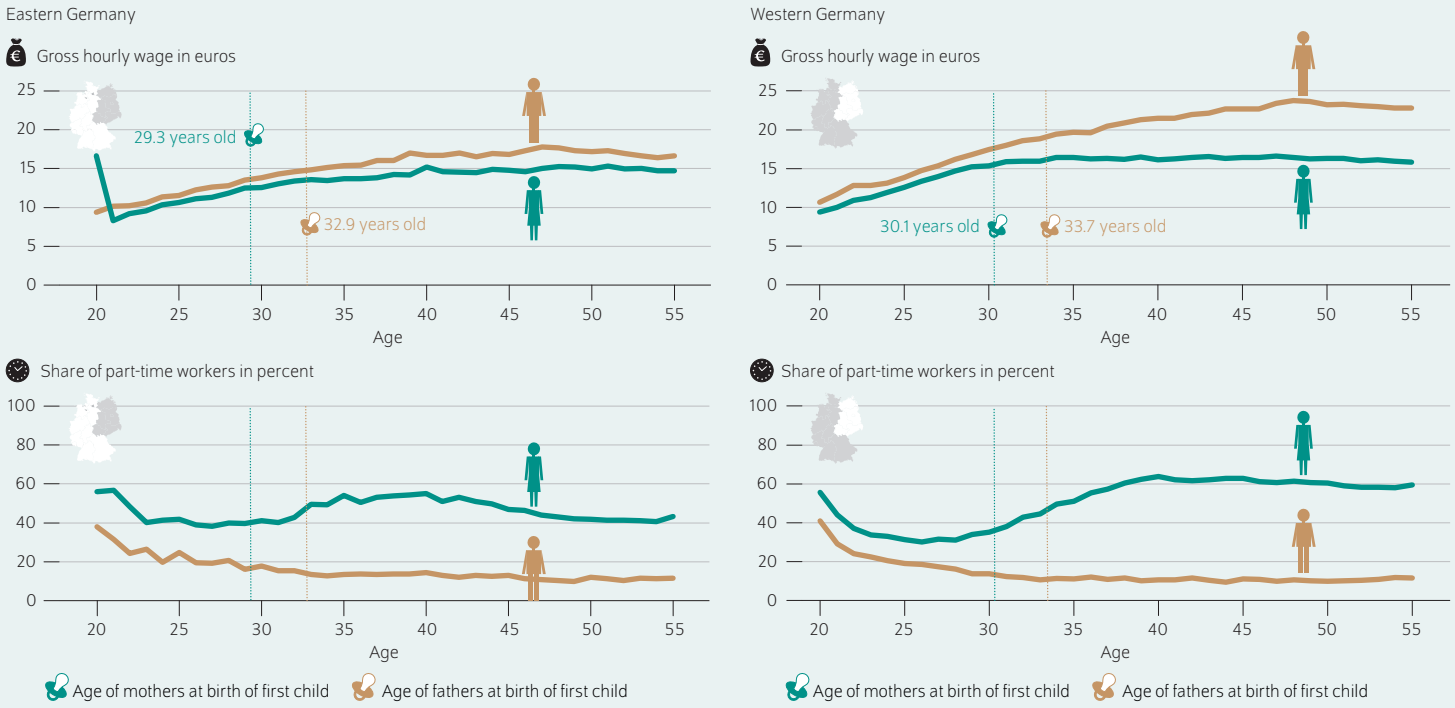
12 In the following, the definition of part-time refers to whether the employee works fewer hours than contained in the standard workweek.

13 The new federal states are the five former East German states that became a part of the Federal Republic of Germany upon reunification in 1990: Brandenburg, Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt, and Thuringia. The old federal states are the 10 states of former West Germany. In this analysis, Berlin, which was a part of both East and West Germany, is considered a new federal state.

14 P. Pallego Granados, R. Olthaus, and K. Wrohlich, "Teilzeiterwerbstätigkeit: Überwiegend weiblich und im Durchschnitt schlechter bezahlt," *DIW Wochenbericht*, no. 46 (2019): 845–850 (in German; available online).

Figure 4

Average hourly wage, share of part-time workers, and average age at the birth of the first child in eastern and western Germany



Note: The estimation is based on employees. Weighted values.

Source: Authors' own calculation based on the Structure of Earnings Survey 2014 and the Microcensus 2014–2016.

The constancy of the female wage level beginning at the age of 30 correlates more strongly in western than in eastern Germany with the birth of the first child.

reject motherhood and remain childfree or postpone motherhood comparatively longer.

Part-time wage gap varies strongly between occupations

However, part-time work does not have a negative impact on wage developments in all occupations.[15] For example, especially in occupations in which earnings increase non-linearly with the number of hours worked (non-linear pay), part-time work leads to lower hourly wages.

Occupations with non-linear pay, in which long working hours are paid especially exorbitant amounts, include, for example, occupations in insurance and financial services. The part-time pay gap is particularly pronounced here and, in a similar vein, this occupation has large gender pay gaps. In occupations in insurance and financial services, there is a clear correlation between women having family-related reductions in working hours and the gender pay gap increasing over the course of employees' lifetimes (Figure 6). Over 90 percent of women and men in occupations in insurance and financial services work full-time when first entering the profession between the ages of 25 and 27 and there is no gender pay gap. This markedly changes around the average age a woman has her first child. By the age of 34, already a third of women are working part-time and the gender pay gap has climbed to almost 25 percent. While men in this occupation are, on average, much older at the birth of their first child (36 years old) than women are, men do not noticeably reduce their working hours after the birth. The proportion of men working part-time remains almost unchanged at under seven percent until old age, which correlates with their wage developments. By age 40, men in the insurance and financial services sector are earning 31 percent more per hour than their female colleagues of the same age, of whom around 60 percent work part-time. Between the ages of 30 and 50, annual wage growth is around two percent for men and only 0.6 percent for women. Thus, a 50-year-old female employee in occupations in insurance and financial services earns, on average, the same hourly wage (23 euros) as a 30-year-old male employee. This suggests that full-time work is remunerated disproportionately for this occupational group.

15 For Germany, see Zucco, "Strong Correlation between Large Gender Pay Gaps and Non-Linear Pay," and for the USA, Claudia Goldin, "A Grand Gender Convergence: Its last Chapter," American Economic Review 104, no. 4 (2014): 1091–1119.

In contrast, educational and social work occupations are among the professions with relatively linear pay, in which hourly wages hardly differ between full-time and part-time workers. For these occupations, the hourly wage for women as well as the share of women working part time across all age groups remains almost constant (Figure 6). For men, too, the wage level in these occupations remains relatively constant up to the age of 43 and is only slightly higher than the wage level for women, although men in this occupation also predominantly work full-time.[16] This highlights the linear relationship between hours worked and wages, as the higher proportion of part-time work for women compared to men is not reflected in lower wage levels for women. In fact, when controlling for observable variables,[17] women in the educational and social work occupations earn two percent more on average than men earn.[18]

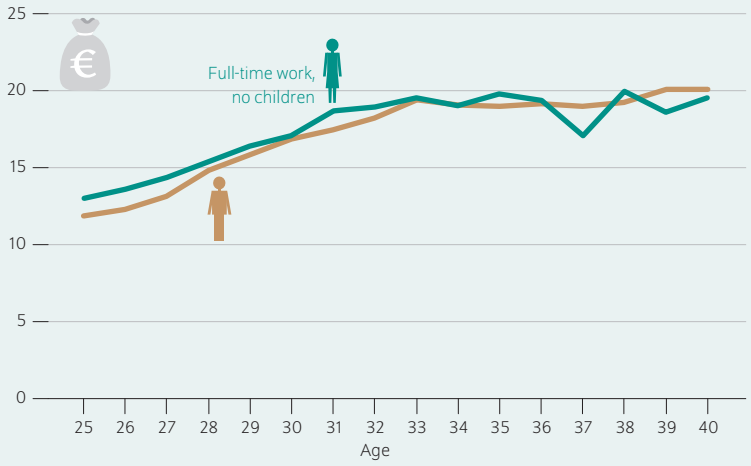
The considerable differences between these two examples show how the part-time wage gap varies greatly between occupations. This can be explained by, among other things, the fact that part-time employees in occupations with non-linear pay are in fewer management positions than full-time employees are.[19]

Conclusion: to reduce the gender pay gap, equalize men and women's working hours

The present analysis has shown that the gender pay gap significantly increases beginning at age 30, the average age at which a woman has her first child. The results indicate that this is linked to the different development of part-time work between men and women. While the share of men working part-time barely changes with age, the share of women working part-time begins to increase significantly at age 30 and remains at a consistently high level until old age. Thus, the birth of children is strongly linked to women's professional development; in contrast, it seems to barely influence men's careers. As part-time work is, on average, less well paid, this discrepancy leads to a further increase in existing wage inequalities over time. As a result, the gender pay gap triples over a period of 20 years between the ages of 30 and 50. This also has important implications for the gender pension gap, as lower incomes simultaneously reduce pension entitlements, thereby perpetuating inequalities in the labor market beyond retirement age.[20]

Figure 5

Average gross hourly wage of men and of full-time working women without children across age
In euros



Note: The estimation is based on employees. Weighted values.

Source: Authors' own calculation based on the SOEP v34. Years 2014 to 2017.

The wage development of full-time working women without children is similar to men's.

To begin closing the wage gap effectively, men and women would have to equalize the amount of hours worked significantly, especially in the career-relevant years between the ages of 30 and 40. And in fact, this is what many employees want. For example, many part-time workers would like to increase their hours while full-time workers would prefer to reduce them.[21]

Politicians, employers, and employees all have a role to play

Political measures could be enacted to support parents in splitting gainful employment and childcare equally. This could be achieved by, for example, expanding the *Elterngeld* (parental leave allowance) months, which are earmarked to one partner. A current study shows that fathers who take parental leave perform more childcare in the long term.[22] Expanding all-day schooling could also allow mothers of school-age children to increase their working hours significantly. Another measure would be to reform *Ehegattensplitting* (the joint taxation of married couples with full income splitting), which, in its current form, rewards an unequal division

16 The number of men in the older age groups in this occupation is too small to draw clear conclusions about the relationship between part-time work and wage trends.

17 The gender pay gap after controlling for some observable variables is referred to as the adjusted gender pay gap. The controls comprise age, tenure, open-ended or fixed-term contract, leadership position, size of the establishment, and education level.

18 Figures on the linearity of remuneration and the adjusted or unadjusted gender pay gap are based on Zucco, "Strong Correlation between Large Gender Pay Gaps and Non-Linear Pay."

19 In industries that tend to pay more linear salaries, for example, a part-time management position is more feasible, see Susanne Kohaut and Iris Möller, "Führungspositionen in der Privatwirtschaft: Im Osten sind Frauen öfter an der Spitze," *IAB-Kurzbericht*, no. 2 (2016) (in German).

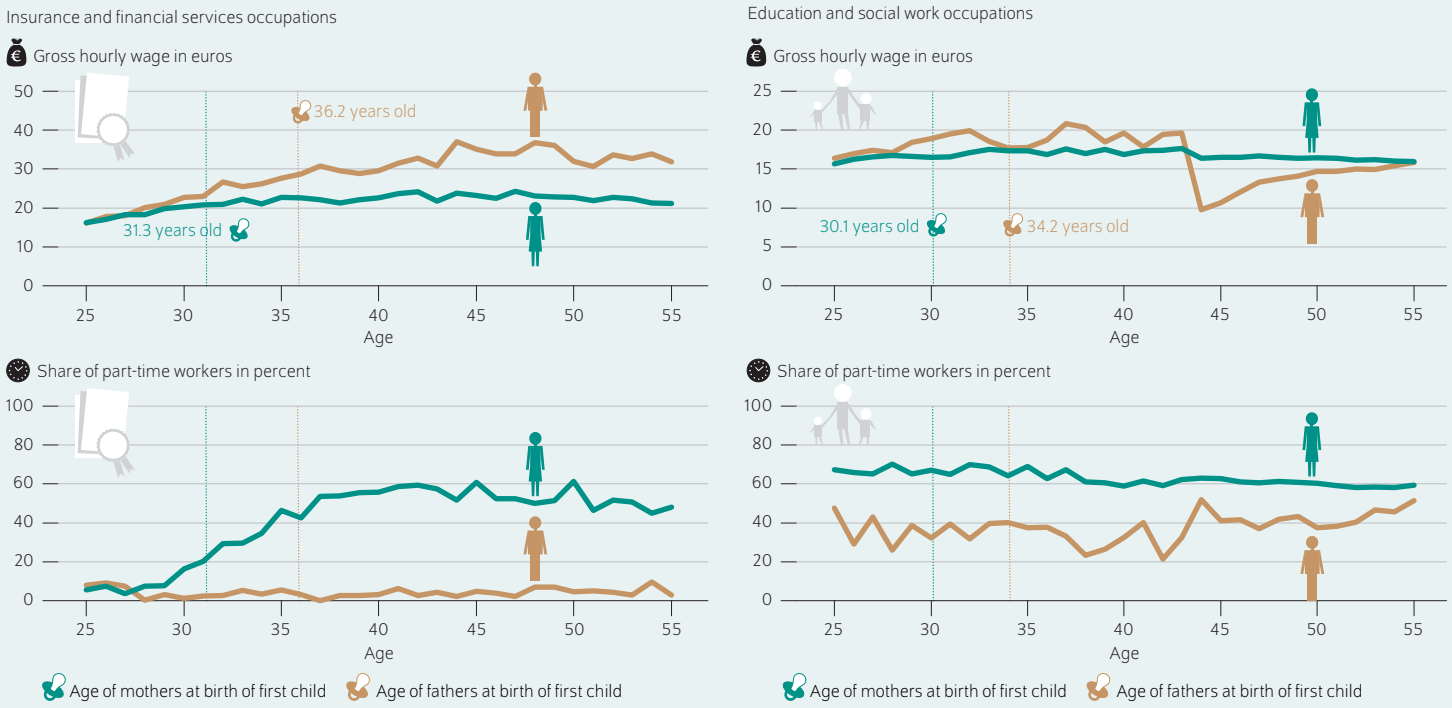
20 Anna Hammerschmid and Carla Rowold, "Gender Pension Gaps in Europe Are More Explicitly Associated with Labor Markets than with Pension Systems," *DIW Weekly Report*, no. 25 (2019): 203–211.

21 Max Harnisch, Kai-Uwe Müller, and Michael Neumann, "Teilzeitbeschäftigte würden gerne mehr Stunden arbeiten, Vollzeitbeschäftigte lieber reduzieren," *DIW Wochenbericht*, no. 38 (2018): 837–846 (in German; available online).

22 Marcus Tamm, "Fathers' parental leave-taking, childcare involvement and labor market participation," *Labour Economics* 59 (2019): 184–197.

Figure 6

Average hourly wage, share of part-time workers, and average age at the birth of the first child for employees in education and social work and in insurance and financial services



Note: The estimation is based on employees. Weighted values.

Source: Authors' own calculation based on the Structure of Earnings Study 2014 and the Microcensus 2014–2016.

The correlation between the constancy of the female wage level beginning at the age of 30 and the birth of the first child varies across occupations.

of labor through maximum tax relief.[23] However, experience has shown that currently, there is no social or political majority for such reform proposals, although the research has long identified the negative work incentives of *Ehegattensplitting* for secondary earners.

Employers can also contribute to equalizing the employment biographies of men and women by implementing flexible working hours. Concepts such as top sharing, where two part-time employees share one leadership position, is often discussed as an effective method of supporting women in the workplace.

However, it is not only mothers who benefit; the opportunity to work part-time in a leadership position also benefits fathers who previously accepted professional disadvantages when sharing childcare work equally with their partner.

Finally, employees themselves must consciously work towards equalizing the working hours of men and women rather than defaulting to cultural norms and stereotypical gender roles. Implementing job sharing would require employees to be willing to make themselves dispensable and pass on their work to colleagues. Fathers would need to be more involved in childcare, with mothers being willing to pass on that responsibility.

There is no single actor who can ensure that the 30-year-old women of today will not be earning 28 percent less than men earn when they are 50 years old; the responsibility to change the situation is in everyone's hands: politicians, employers, and employees.

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23 Stefan Bach, Johannes Geyer, Peter Haan, and Katharina Wrohlich, "Reform des Ehegattensplittings: Nur eine reine Individualbesteuerung erhöht die Erwerbsanreize deutlich," *DIW Wochenbericht*, no. 41 (2019): 13–19 (in German; available online).

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