Is There Really Unequal Pay for Equal Work Between Men and Women in the Czech Republic? Problems with the Decomposition of Wage Determinants*

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Abstract: This study focuses on issues of the adjusted gender pay gap (AGPG) and problematises existing approaches to calculating this indicator, especially Eurostat's methodology. It analyses the different factors and variables with which Eurostat and other authors work, noting flaws in their measurement methods. The unadjusted gender pay gap (GPG) is typically divided into explained and unexplained parts, with the latter interpreted as the effect of unequal pay for equal work. This study demonstrates why the unexplained part might be considerably smaller than reported by existing studies (typically at 14%–15% and 17% in the case of Eurostat). What is key to determining the size of the explained part of the GPG is what productive characteristics and how many of them are included in statistical model. Existing analyses have artificially increased the adjusted part of the GPG due to simplifications in their application. For example, as this study shows, substituting the category of total job experience with the category of age has a significant impact, along with several minor shifts in the statistical analysis. When combined, these shifts are responsible for the substantial overestimation of the adjusted GPG. This study aims to eliminate these flaws and provide a theoretical and descriptive account of the reasons behind the overestimation.

Keywords: unadjusted gender pay gap, adjusted gender pay gap, Blinder–Oaxaca decomposition, equal pay, discrimination, Czechia

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Introduction

The issue of gender-based pay inequality has been resonating in European societies at an accelerated rate. As such, it has increasingly been the focus of academic studies, books, media appearances, popularisation articles, political statements and concrete national policies, action plans and European directives.[1]

Discussions of gender-based pay inequality are centred on the concept of the unadjusted gender pay gap (GPG), which is defined as the difference between men's and women's mean gross wages divided by men's mean gross wage and expressed as a percentage. The GPG tells us how many per cent lower an average working woman's income is than an average working man's income.[2] Therefore, *by definition*, the difference obtained does not reflect different productive characteristics of the two groups, such as representation in various (differently remunerated) occupations, total years of job experience, level of economic activity or the fact that men with the same contracted working time as women work in average three hours per week longer than women. Irrespective of the number of hours written in people's contracts, the gender gap in 'hours actually worked per week' has reached as many as 4.2 hours (Czech Statistical Office [CZSO], 2022a, p. 218).[3] Another neglected factor is that men are statistically significantly more likely to work overtime or at night[4] (Czech law mandates a bonus of 'at least 25%' for overtime hours and '10% of average earnings' for night work [Labour Code, Sections 114 and 116]) and to pursue more at-risk or physically/mentally more demanding occupations (CZSO, 2021; European Working Conditions Survey, 2023). Many more items could be added to the list of differences in average productive characteristics between both groups, but doing so would not be purposeful here. The logical inference is that if each group exhibits different productive characteristics that influence their wage levels, then their average wages will also

[1] See, e.g., the Action Plan for Equal Remuneration of Women and Men 2023–2026 adopted by the Czech government in December 2022; the Gender Equality Strategy for 2021–2030 elaborated by the Office of the Government of the Czech Republic in 2021; the project '22% towards Equality' launched by the Ministry of Labour and Social Affairs; and at the European level, the Pay Transparency Directive (European Commission, 2021).

[2] Some authors work with median wages, others convert mean monthly wages into mean hourly wages, etc.

[3] This aspect requires some clarification. Major analyses of the unadjusted (GPG) and adjusted gender pay gap (AGPG) are calculated on the basis of hourly earnings, so it would appear that the difference in hours worked is indeed included in the GPG analysis. As we will show, the reality is much more complicated, and this gap in actual hours worked is not (or only partially) involved. Moreover, the conversion to hourly earnings is not unproblematic, and it introduces quite important biases into the analysis. See below sections "Hours actually worked" and "The Relationship Between Hours Worked and Wages is not a Linear Function".

[4] There are only 70 women for every 100 men who 'sometimes' work nights. The ratio is the same for women and men who 'usually' work at night. (CZSO, 2022a, p. 227, data for 2020)

Table 1. Average gross (unadjusted) gender pay gap in EU countries

Territory, country	2010	2014	2015	2016	2017	2018	2019	2020
EU27	*15.8*	*15.7*	*15.5*	*15.1*	*14.6*	*14.4*	*14.1*	*13.0*
Belgium	10.2	6.6	6.4	6.0	5.8	5.8	5.8	5.3
Bulgaria	13.0	14.2	15.5	14.6	14.3	13.9	14.1	12.7
Czechia	*21.6*	*22.5*	*22.5*	*21.5*	*21.1*	*20.1*	*18.9*	*16.4*
Denmark	17.1	16.0	15.1	15.1	14.8	14.6	14.0	13.9
Estonia	27.7	28.1	26.7	24.8	24.9	21.8	21.7	21.1
Finland	20.3	18.4	17.5	17.5	17.1	16.9	16.6	16.7
France	15.6	15.5	15.6	15.9	16.3	16.7	16.5	15.8
Croatia	5.7	8.7	.	11.6	12.3	11.4	11.5	11.2
Ireland	13.9	13.9	13.9	14.2	14.4	11.3	.	.
Italy	5.3	6.1	5.5	5.3	5.0	5.5	4.7	4.2
Cyprus	16.8	14.2	13.2	12.3	11.2	10.4	10.1	9.0
Lithuania	11.9	13.3	14.2	14.4	15.2	14.0	13.3	13.0
Latvia	15.5	17.3	18.4	19.7	19.8	19.6	21.2	22.3
Luxembourg	8.7	5.4	4.7	3.9	2.6	1.4	1.3	0.7
Hungary	17.6	15.1	14.0	14.0	15.9	14.2	18.2	17.2
Malta	7.2	10.6	10.7	11.6	13.2	13.0	11.6	10.0
Germany	22.3	22.3	21.8	21.1	20.4	20.1	19.2	18.3
Netherlands	17.8	16.2	16.1	15.6	15.1	14.7	14.6	14.2
Poland	4.5	7.7	7.3	7.1	7.0	8.5	8.5	4.5
Portugal	12.8	14.9	16.0	13.9	10.8	8.9	10.6	11.4
Austria	24.0	22.2	21.8	20.8	20.7	20.4	19.9	18.9
Romania	8.8	4.5	5.6	4.8	2.9	2.2	3.3	2.4
Greece	15.0	12.5	.	.	.	10.4	.	.
Slovakia	19.6	19.7	19.7	19.2	20.1	19.8	18.4	15.8
Slovenia	0.9	7.0	8.2	8.1	8.4	9.3	7.9	3.1
Spain	16.2	14.9	14.1	14.8	13.5	11.9	11.9	9.4
Sweden	15.4	13.8	14.0	13.3	12.5	12.1	11.8	11.2

Source: Eurostat as at 8 June 2022, CZSO (2022a). Focus on Women and Men–2022, chapter 4.37, p. 240

Note: Includes only businesses with 10+ employees. Includes economic activities under sections B through S, except for section O of NACE Rev.2.

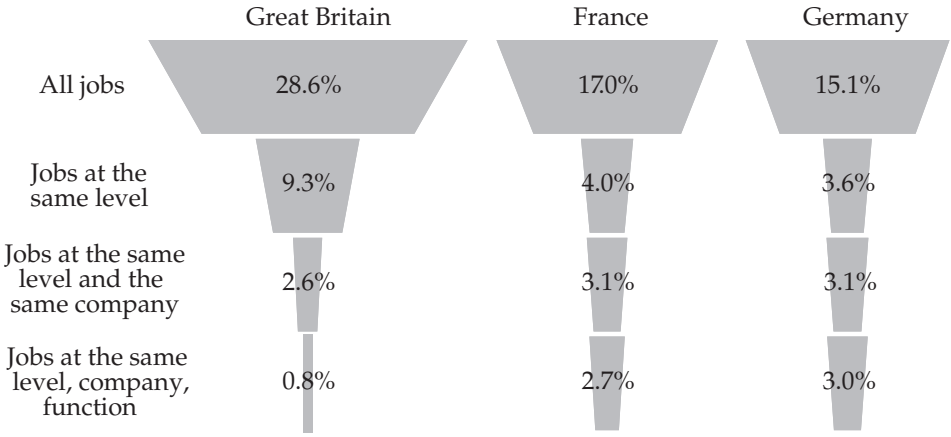
differ. In this vein, it cannot be surprising that men have different average pay than women. Clearly, given the different characteristics of both groups, there was no statistical or logical reason for them to have the same pay. In other words, unadjusted GPG levels do not help us determine whether this difference exists due to pay inequality or not; whether or not women are being discriminated against by receiving less money than men for equal work. Unadjusted GPG could serve merely as a starting point for a more detailed analysis. Table 1 shows the development of the unadjusted gender pay gap (i.e. the difference between men's and women's average earnings in the Czech Republic and other countries). The Czech GPG, based on Eurostat, decreased from 20.1% in 2018 to 15.2% in 2021 (CZSO, 2022a, p. 240).[5] However, if we want to determine the extent of the gender pay gap for the same work (i. e. AGPG), we need to compare men and women with the same productive characteristics. In other words, we need to eliminate the effect of women and men having, on average, different productive characteristics. The pay gap between women and men with the same productive characteristics is expressed by the adjusted gender pay gap category (AGPG). In contrast to the GPG, the adjusted gender pay gap (AGPG) serves as an approximate indicator of unequal pay for equal work and should be strictly distinguished between both categories.

Adjusted gender pay gap

Most empirical studies on gender wage discrimination calculate the AGPG using a formal statistical technique designed by Oaxaca (1973) based on Becker's (1957) theory of labour market discrimination. Given that Blinder (1973) designed a similar method, the technique has been named the 'Blinder–Oaxaca decomposition'. This approach defines discrimination as the difference between an observed gender pay gap and one that would exist if women and men were remunerated on the basis of the same 'productive characteristics' (e.g. qualifications, job experience, hours actually worked, etc.) and exhibited equal levels of those characteristics. In contrast, wage differences based on the 'non-productive characteristics' of workers, including their gender (but also sympathy, etc.), are viewed as discriminatory (Grimshaw & Rubery, 2002). The practical uses of the Blinder–Oaxaca approach

[5] Eurostat calculates the unadjusted GPG by including occupational sectors from 'NACE sections B to S, without O' (European Commission, Eurostat, 2018, p. 6). Therefore, the excluded sections are agriculture, forestry and fishing (A); public administration, defence and compulsory social security (O); activities of households as employers (T); and activities of extraterritorial organisations and bodies (U). It is reasonable to assume that, in particular, the decision to exclude the sector of agriculture, which is dominated by men with low wages, and the exclusion of sector O, where the GPG is significantly lower than in the other sectors, increases even the unadjusted GPG, from which the adjusted GPG is subsequently calculated.

Figure 1. International comparison of the unadjusted and adjusted gender pay gap, pay gap between women and men, 2016, percentage of men's wages (full-time pay)

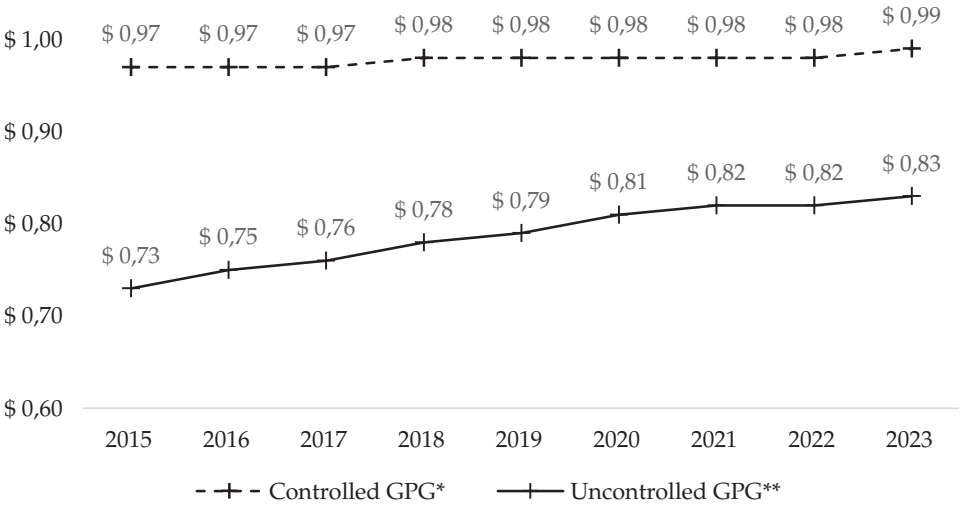


Source: Korn Ferry database, cited from The Economist (2017, 1 August).

include placing decomposition into individual productive factors that each explain a portion of the unadjusted GPG. To simplify, the sum of such productive factors equals the 'explained' part of the GPG, and the portion that cannot be explained by the different productive characteristics of men and women is referred to as the 'adjusted' or 'unexplained' gender pay gap. This adjusted gap (or unexplained part of the GPG) is interpreted as a 'gap in pay for equal work and work of equal value' (Ministry of Labour and Social Affairs, 2022, p. 7) or similarly as 'approximation of potential discrimination, i.e. how the labour market rewards men and women in an unequal way for the same work.' (European Commission, Eurostat, 2018, p. 17; Weichselbaumer & Winter-Ebmer, 2005).

AGPG values, as an approximation of the unequal remuneration of men and women for equal work, are shown in Figure 1–2 and Table 2. Based on highly representative data from the Korn Ferry database of the wages of 12.3 million workers at 14,284 companies in 53 countries, the journal stated that 'when all job differences are accounted for, the [gender] pay gap almost disappears' (*The Economist*, 2017). For the Czech Republic, it indicates an even higher difference between men's and women's average wages (i.e. *unadjusted* GPG) than Eurostat or the CZSO. However, a comparison of workers in the same position, occupation and company indicates an AGPG of as little as 3.8% in the Czech Republic (Korn Ferry, 2016, p. 7). *The Economist* (2017) also presents comparable results for other countries (see Figure 1) as well as Chamberlain, Zhao, Stansell (2019) (see Table 2). The Payscale (2023) database (Figure 2) indicates a 1–2% gender pay gap

Figure 2. Unadjusted and adjusted gender pay gap in the USA, 2015–2023



Source: Payscale 2023

Note: * Uncontrolled Gender Pay Gap (Opportunity Pay Gap): Measures median salary for all men and all women regardless of job type, seniority, location, industry, years of experience etc.

** Controlled Gender Pay Gap (Equal Pay for Equal Work): Measures pay for men and women with the same job and qualifications

for 'equal work' in the US. (Notably, according to the Organisation for Economic Co-operation and Development, 2023, the unadjusted GPG in the US is higher than in the Czech Republic.) In general, the AGPG—in contrast to the GPG—is in the range of lower units of percentage according to these data (see Figure 1–2 and Table 2).

This is a much lower gap than that indicated by Křížková and Pospíšilová (2023), among others. They argued that the 'equal remuneration of women and men for equal work is not safeguarded in the Czech Republic. If men and women work in the same positions,[6] women earn 9% lower hourly wages, on average' (Křížková & Pospíšilová, 2023, p. 54). Křížková et al. (2018) stated the following regarding the Czech Republic:

[6] 'Same position' is defined by the authors as a combination of the same workplace and the same occupational category according to the four-digit ISCO classification (International Standard Classification of Occupations). In their analysis, the term 'same position' does not mean the same position within the company's hierarchy. Neither does it say anything about the worker's level of responsibility, decision-making autonomy, length of job experience, being a subordinate/manager, etc.

Table 2. The unadjusted and adjusted gender pay gap by country

	Unadjusted base gender pay gap		Adjusted base gender pay gap	
	Average cents/ pence earned by women per dollar/pound/ euro of male earnings	Percentage male pay advantage	Average cents/ pence earned by women per dollar/pound/ euro of male earnings	Percentage male pay advantage
Australia	0.85	15.1%	0.97	3.1%
France	0.88	11.6%	0.96	3.7%
Canada	0.84	16.1%	0.96	4.0%
United States	0.79	21.4%	0.95	4.9%
United Kingdom	0.82	17.9%	0.95	5.0%
Singapore	0.87	12.8%	0.95	5.2%
Germany	0.78	22.3%	0.94	6.4%
Netherlands	0.81	18.9%	0.93	6.6%

Source: Glassdoor Economic Research, cited from Chamberlain et al. (2019, p. 4)

> [I]n 2016, the gender pay gap was around 26%, of which 11 percentage points (43% of the total GPG) were explained by the factors included in the model, while the remaining 15 percentage points (57% of the total GPG) remained unexplained. (p. 95)

Similarly, in another study, Křížková et al. (2020, p. 25) claimed that the unexplained part of the GPG was 14%. Furthermore, Eurostat indicated even higher levels of the AGPG (i.e. the unexplained part of the GPG)—as high as 17% (Leythienne & Pérez-Julian, 2021, p. 20).

The conclusions of the studies mentioned above were subsequently incorporated into government documents (Office of the Government of the Czech Republic, 2021; Ministry of Labour and Social Affairs, 2022).[7]

The Eurostat data provide the key practical basis for EU and individual member states' policies. Eurostat elaborated on its own methodology for determining the AGPG, published in the European Commission document named 'Adjusted Gender Pay Gap' (European Commission, Eurostat, 2018). In the following section, we critique Eurostat's methodology and its approach to the decomposition of the factors influencing the AGPG. However, as our critique im-

[7] For example, the Czech government's website states, 'We know that women receive lower pay than men for equal work with the same employer' (Government of the Czech Republic, 2022), referring directly to Křížková et al. (2018).

plicitly affects other approaches to AGPG measurement, we also review the work of Křížková and Pospíšilová (2023) (who, however, do not use the Blinder-Oaxaca decomposition in their study, but use a different methodological approach) and Křížková et al. (2018).

Eurostat's approach to calculating the adjusted gender pay gap and the decomposition of factors

As stated above, Eurostat's methodology standardly divides the unadjusted (gross) gender pay gap into an explained part (explained by the different characteristics of both groups) and an unexplained part, i.e. AGPG (European Commission, Eurostat, 2018, p. 17). As shown in Table A1 in online Appendix[8], the explained part comprises as few as three percentage points for the Czech Republic (Gender Pay Gap Statistics—Analytical Tables, Table 2, 2022; in this paper Table A1). When reviewing the weights attached to the individual factors included in the explained 3 percentage points, we found low values representing different characteristics of both groups *prima facie* implausible. 'Economic activity' is the only factor in excess of 1 percentage point: According to Eurostat, it explains 3.2 percentage points of the unadjusted gender pay gap in the Czech Republic (Gender Pay Gap Statistic—Analytical Tables, Table 2, 2022; in this paper Table A1). Importantly, the CZSO (2022b) data indicate that men's level of economic activity (83.8%) exceeds that of women by 13.8 percentage points.[9] The gap is not due to women's lower diligence; instead, it can be almost fully explained by the fact that it is mostly women who take care of disabled, sick or otherwise unable family members; women are more likely than men to study at university; personal health problems are a third important reason for inactivity or low economic activity. Other causes are relatively small (CZSO, 2022a, p. 196).

As shown in Table A3, men's economic activity reaches high levels as early as the 25–29 age category (93.9%, 2021 data) and continues to increase with age, being consistently above 90% until the age of 60. As for women, only the 45–55 age group exhibits economic activity levels comparable to men's (above 90%). Outside that decade, women exhibit much lower levels of economic activity. This significantly impacts the different remunerations of the two groups, and that impact is certainly greater (see next two sections) than the 3.2 percentage points reported by Eurostat (see Table A1).

[8] Available at https://doi.org/10.13060/csr.2024.032.

[9] The higher economic activity rate of men is also found in comparison to childless women, even in the EU average. 'In the EU in 2016, the employment rate for women without children was 65%, while it was 73% for men' (Czech Statistical Office, Eurostat, 2017a). Thus, the higher economic activity of men cannot be explained solely by the fact that women generally take more care of the family.

Finally, all other factors considered by Eurostat are in the range of several tenths of a percentage point, and when collectively included in the model, they decreased the explained part of the GPG by two-tenths of a percentage point (from 3.2 to 3). Next, we take a closer look at each of these factors.

The age factor as a spurious variable causing a biased adjusted gender pay gap

Age is the first factor on Eurostat's list. We find this category problematic for several reasons. The likely rationale behind its inclusion is that as wages grow with age, there is a relationship between age and wage levels. According to CZSO (2022c, A3) data, this is the case (until a certain age is reached): A 30-year-old earns 37% more than a 20-year-old, and a 40-year-old earns 43.9% more than a 20-year-old. However, this is not caused by greater *age* but by having greater *job experience*. Age represents a proxy variable here, and job experience (not age) is the actual determinant of wage level.[10]

However, Eurostat, Křížková and Pospíšilová (2023) and Křížková et al. (2018) have compared the *age* of both groups instead of their years of job experience. This substitution leads to highly biased AGPG levels. It has been shown that men exhibit substantially longer working lives (39.2 years) than women (32.7 years), with a mean gender gap of 6.5 years (CZSO, 2022a, p. 220). This gap is due to several factors, one of which is that women obtain their first jobs later than men and retire earlier.[11] This job experience gap is further increased by the fact that women predominantly take parental leave (at a mean age of 28.2 years in the EU). Note that in Czech public-sector jobs, parental leave is, by law, counted towards an adjusted length of job experience. This causes a further bias in the statistic: Men and women with equal *adjusted* years of experience have different amounts (i.e. years) of *actual* job experience. Thus, when comparing men and women *with equal adjusted (or formal) length of job experience*, a gap caused by different lengths of *actual job experience* may appear as discrimination against women. At the same time, the inclusion of parental leave in adjusted years of job experience is likely the main reason why the GPG in the public sector is lower than in

[10] According to the CZSO (2022c, A3), an average worker earns 32,279 CZK at the age of 20–25 years, 44,278 CZK 10 years later and 46,462 CZK another 10 years later (at the age of 40–44 years). Thus, the average worker's wage grows at an average pace of 2.2% for each year worked in the first 20 years. This later slows down, and workers older than 50 years of age even record negative growth. Despite the slowdown that occurs later in life, on average, each year of experience has a significant impact on wages.

[11] In the EU as a whole, men begin their first employment at a mean age of 22 years, one year earlier than women, and women retire 1.1 years earlier, on average (Czech Statistical Office, Eurostat, 2017b, Chapter 1.1). Thus, at the very time the average EU woman enters the labour market, the average man already has one year of job experience.

the private sector, where organisations have a stronger tendency to pay workers on the basis of *actual* length of job experience and their resulting qualifications and competences (rather than only *formal* or *adjusted*).

The above-mentioned level of economic activity is probably the best measurement of the total length of job experience of women and men as separate groups. This indicates the extent to which women and men obtain job experience by working. For example, a 50% level of economic activity among men in a given year means that the length of job experience for men as a whole has increased by half a year. Table A2 illustrates the difference in years of job experience between men and women in the Czech Republic throughout their careers. While the gender gap in the length of job experience varies from one year of a career to another, the mean values for the entire productive life based on CZSO (2022a, p. 194) data indicate that *the average Czech woman has four fewer years of job experience than the average man*. Given a wage increment of 1.1% for each additional year of job experience (CZSO, 2017),[12] this factor is one of the *key* differences in the productive characteristics of women and men, explaining approximately 4.4 percentage points of the total GPG. From this perspective, we find it striking the existing Czech analyses of the AGPG (Křížková & Pospíšilová, 2023; Křížková et al., 2018) have not included the factor of total years of job experience, which has likely caused an overestimation of the AGPG. Furthermore, official government documents were directly based on overestimated AGPG results mentioned above. This is the case with the *Gender Equality Strategy for 2021–2030* (Office of the Government, 2021) and the *Action Plan for Equal Remuneration of Women and Men 2023–2026* (Ministry of Labour and Social Affairs, 2022).

According to O'Neill (2003), narrowing the gender gap in years of job experience was 'the key factor underlying the decline in gender earnings disparities between 1979–2001' in the US. Claudia Goldin (2023) came to the same conclusion when she examined the evolution of wages for male and female lawyers in the US. The reason why women lawyers earn less, on average, she argued, is not the 'discriminatory practice of promotion and mentorship' or 'gender bias'[13] but rather the fact that 15 years after graduation, 'men accumulated more legal expe-

[12] Overall (from ages 19–64 years), wages grow, on average, 0.8% for each year worked (Czech Statistical Office, 2017, own calculations). When looking directly at the relationship between wages and length of employment, there is an annual wage growth of 1.4% during the first 30 years and 1% during the first 40 years (CZSO, 2022c). There are several ways of estimating the effect of each additional year of job experience on wage level. However, available data indicate an average increment of 0.8%–1.4% per year of job experience, with 1.1% being the central value. This data will be used in the next sections of this study. Pytlíková (2015, pp. 2, 19) reached a similar result based on EU–SILC (European Union – Statistics on Income and Living Conditions) data for 2012, indicating a wage decrease of 1.1% for each year on parental leave (which means one less year of job experience).

[13] 'Bias exists in many law firms, but it is not the primary cause of gender differences in promotion and earnings' (Goldin, 2023, p. 182).

rience' (because men work, on average, more years and more hours per month than women). She concluded that the 'underlying cause of the gap is not their genders' (Goldin, 2023, p. 180). Rather, job experience and real working hours play decisive roles.

With this in mind, let us return to the problem of the AGPG calculation method. Arguably, if a factor (e.g. total length of job experience) is not included, the analysis implicitly assumes *equal* levels of the parameter for both groups under comparison. Since this assumption regarding the total length of experience of men and women does not correspond to the facts, analyses that neglect this factor necessarily lead to a highly biased and overestimated AGPG.

However, even more biased results are obtained when total years of job experience are *substituted* with the category of age, as in the case of Křížková and Pospíšilová (2023) and Křížková et al. (2018), among others; substituted with 'job experience in current enterprise'; or even both (as in Eurostat's methodology). The next section demonstrates why this is so.

Including age factor causes a spurious increase in the adjusted gender pay gap

By neglecting the factor of total years of job experience, analyses artificially increase the unexplained part of the gender pay gap (i.e. unequal pay for equal work). A significant factor that explains a large part of the GPG is simply ignored. Nevertheless, including age instead of total experience causes a *further increase* in the AGPG and its deviation from reality. According to Křížková and Pospíšilová (2023), age can be used as an approximation for or *in lieu* of the total years of job experience category. The authors explicitly stated in their analysis that 'age partially, though of course not perfectly, *substitutes* the variable of length of experience, which it is not appropriate to include in the model *simultaneously* due to its *high correlation* with age' (Křížková & Pospíšilová, 2023, p. 55, emphasis is ours).

We agree with Křížková and Pospíšilová (2023) that instead of including *both* age and length of job experience in the model, only one of the categories should be included. Even though age is somewhat correlated with length of job experience, the problem is that the correlation is much stronger among men than women, and both groups are clearly distinguished *precisely* by this correlation gap. Women exhibit a weaker correlation due to their interrupted careers, which means that age does not automatically translate into length of job experience. At the same time, this difference is one of the main reasons behind the pay gap. However, this difference is not only *nullified* by including only the age category in the statistical model (and neglecting the length of job experience category); the involvement of the age category in the statistical analyses even *increases* the unexplained part of the GPG. The age factor represents a negative number, so it does not contribute at all to the explication of the GPG but rather reduces its explained

part. Therefore, understandably, the ensuing analysis indicates a much higher level of wage discrimination (AGPG) than exists in reality.[14] Let us examine this more closely.

Including the age category in the statistical model practically means comparing the age of *working* women with that of *working* men while implicitly assuming that wages grow with age. Because young women taking maternity and parental leave do not receive wages, they are excluded from the statistical comparison of working women and men. This is once again apparent in the data on women's economic activity. There are ~20% fewer economically active women than men aged 20–24 years, and almost 30% fewer in the 25–29 age category; therefore, it comes as little surprise (given the inactive women's exclusion from wage statistics) that working women are, on average, *older* than working men. The CZSO (2022a, p. 194) data indicate a mean age of 43.6 years for working women and 42.3 years for men in the year 2021,[15] a gender gap of 1.3 years.[16] For the same reason, Eurostat (see Table A1) found a negative contribution of age to explaining the unadjusted gender pay gap.[17] In other words, as mentioned above, the age factor not only fails to explain any part of the GPG but even increases its unexplained part (by reducing the explained part). In contrast, total length of job experience is a highly significant explanatory factor for a substantial part of the GPG. Given the gender gap of ~4 years in total length of job experience and the

[14] The reason why Křížková and Pospíšilová (2023) – and other authors, including Eurostat – do not include length of job experience in their statistical models is most likely that the available data on employees lack this information. However, this does not change the fact that the absence of the length of job experience variable still makes the claims about a high AGPG very problematic. If this variable is not included (or even approximated by the age variable), the statistical model must logically always show a high AGPG (considering the fact that the difference in length of job experience between men and women is, in reality, one of the biggest differences between their productive characteristics). Therefore, it is nearly impossible to reach a result other than a high AGPG. If we encounter an absence of data on the length of job experience, it may be more appropriate to approximate this variable on the basis of the economic activity rates of the two groups throughout their careers rather than simply substituting it with age. Data on the economic activity rate will illustrate the disparity in overall job experience between genders at each life stage and the average difference in job experience length between the two groups (see Table A2).

[15] According to the CZSO (2022c), the mean age of workers was 43.4 years for men and 44.8 for women in 2022.

[16] The data indicate that working women are, on average, older than working men, despite the fact that men retire later and, even in retirement, it is mostly men who continue to work. When comparing the age of working women and men in the category up to 55 years old, there will be more significant age differences, where women will be older than men.

[17] See also Křížková et al. 2018. In addition to age as a factor that contributes negatively to the explained part of the GPG, the authors also mention 'job experience' (with 'job experience' meaning 'job experience in the current firm', p. 74). Job experience in current firm reduces the value of the explained part of the GPG by 0.52 percentage points, and education reduces the explained part by 0.67 percentage points. Křížková et al. 2018, p. 77.

1.1% increment in wage levels for each additional year of job experience, this factor *explains* ~4.4 percentage points of the GPG.

The age category, which is supposed to 'substitute' total job experience, although 'not perfectly', according to Křížková and Pospíšilová (2023), not only falls short of explaining any part of the GPG but even, as we said, increases the amount of the adjusted GPG by ~4.4 percentage points. Thus, including age instead of total job experience is not only far beyond 'not perfect' but it causes a substantial bias and spurious increase in the unexplained part of the GPG.

Another notable fact in the context of the age category is that data indicate that, for the reasons described above, working men are, on average, younger than working women (by 1.3 years). On the other hand, if we compare only employees in managerial positions, it is the women who are younger (in the private sector in the Czech Republic for the years 2020 and 2021, they are younger by about 7 months).[18] Thus, it appears that women reach managerial positions[19] at a younger age, despite having on average less total experience and working fewer hours per month than men. This seems to challenge the popular notion of the glass ceiling. As Farrell (2005) notes, despite the fact that women are less represented in managerial positions, they actually reach managerial positions after a shorter period of experience than men, who need a longer period of work experience to reach a managerial position.

We should add that male managers can be expected to retire later than female managers, which increases the average age of male managers. This could hypothetically partly explain why male managers are on average as a group older than female managers. However, even taking this into account, women still appear to reach managerial positions earlier than men. For the United States, Farrell (2005, p. 86) gives the following figures:

> Prior to age 40, women are 15 times more likely than their male counterparts to become top executives at major corporations. (Of top female executives at major companies, 21.4% are under 40, while only 1.4% of the male executives are under 40.) In a study of the top five executives at almost 3,000 of the country's largest firms, the women's average age was 48; the men's, 53.

As we said male managers can be expected to retire later than female managers, which increases the mean age of male managers. Nevertheless, women seem to reach managerial positions earlier than men on average.

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[18] We would like to thank Petr Soukup for providing us with this data from the Trexima company.

[19] Concerning the GPG among top managers, Bugeja, Matolcsy, and Spiropoulos (2012) analysed the question of the GPG among top managers (CEOs). Their results 'indicate that there is no difference in total pay, salary or bonus for female CEOs.' (p. 859)

Job experience in current enterprise

The category of 'job experience in current enterprise' plays a similar role as age in artificially increasing the AGPG. Table A1 shows that in Eurostat's analysis, 0.2 percentage points of the total GPG is explained by 'job experience'. At first sight, this suggests that Eurostat included the total length of job experience in its analysis. However, in a note attached to the above-mentioned publication on the Adjusted Gender Pay Gap (European Commission, Eurostat, 2018), it is explained that instead of total length of job experience, 'job experience' stands for 'job experience in current enterprise'. This causes additional bias in the resulting AGPG.

The fact that men change jobs more frequently than women decreases their level of 'job experience in current enterprise',[20] while the fact that men have more total years of job experience travels in the opposite direction.[21] The resulting adjusted gender gap in 'job experience in current enterprise' amounts to 0.2% in favour of men. By only including the length of 'job experience in current enterprise' in its statistical model (instead of total job experience), Eurostat effectively assumes that a worker's job experience is nullified by each change of employer. We find this assumption absurd: When a person gains experience in one job, they seek better opportunities. When changing employers, they do not lose their job experience; they 'take it with them'. The employee's prior work experience is considered in determining his or her salary. Moreover, from a career path perspective, the highest wage increases are achieved by changing employers. Employees typically accept a new job when they are offered higher earnings than in their existing job. Thus, although men have, on average, four more total years of job experience,[22] the variable used by Eurostat to account for this fact exhibits almost the same levels for both genders (by only accounting for 'job experience in current enterprise'). In Eurostat's analysis for 2014, 'job experience in current enterprise' contributed zero to the explained part of the GPG (European Commission, Eurostat, 2018, p. 12).[23]

[20] See, for example, US Bureau of Labor Statistics, US Department of Labor (2023, pp. 2–3).

[21] If men changed jobs as frequently as women, their length of job experience in the same firm would logically be higher (given that their overall length of work experience is, on average, higher). However, when hypothetically assuming an equal job fluctuation rate between men and women, the total length of job experience increases men's length of experience in one firm (compared to women). Conversely, changing jobs more frequently decreases their length of experience in one firm. These two factors go against each other and tend to nullify their contribution to 'job experience in current enterprise'. Thus, the contribution to the explained part of the unadjusted gender pay gap by the category of 'length of experience in current enterprise' is, according to Eurostat, either exactly zero (see European Commission, Eurostat, 2018, p. 12) or very close to zero (0.2 percentage points in 2018) (see Table A1).

[22] According to the CZSO (2022a, p. 220) data for 2021, men's working lives are as many as 6.5 years longer than women's — a 16.6% difference.

[23] Křížková and Pospíšilová (2023) also mentioned the weak effect of the 'job experience

Occupational choice

Another factor significantly influencing the mean unadjusted gender pay gap is men's and women's occupational choices—they are not equally represented in various industries, and those industries exhibit different levels of mean wages.[24]

In contrast, different gender proportions in different industries have a remarkably strong effect on GPG. For example, the GPG was reduced by ~50% when men and women working in the same occupational category were compared (Křížková & Pospíšilová 2023, p. 45). In other words, the fact that women opt for different occupations than men explains about half of the unadjusted GPG.[25]

Notably, even Eurostat indicates a negative number for this factor ('occupation'; see Table A1). According to Eurostat, different occupational choices do not explain any part of the GPG and instead increase the unexplained part by 0.3 percentage points. This would mean that women are more often working in better-paid occupations than men—a result that is far from reality. On the contrary, women are more likely to be employed in lower-paid sectors. Eurostat's analysis indicates such a weak effect of occupational choice because of the method used to differentiate occupations. Eurostat uses the two-digit ISCO-08 and refrains from differentiating occupations within each two-digit category, thus treating them as *equal* or *same* for statistical purposes. However, the two-digit classification is *highly coarse-grained*. At the same time, the finer-grained a classification, the larger part of the GPG that is explained by the occupational choice category (and thus the higher the explained part of the GPG as such).

An examination of the various two-digit categories reveals the kinds of occupations that are, sometimes surprisingly, treated as equal. In other words, very different occupations belong to the same two-digit occupational category and are treated as the same in terms of statistical analysis. For instance, sub-major Group 12 contains finance managers, personnel managers and cleaning services managers. In Group 13, there is a mix of occupations, such as fishing vessel skippers (coastal waters), mine managers, warehouse managers, internet service providers, childcare centre managers, directors of nursing, housing services managers, deans (university), head teachers, finance managers, archive manag-

in current enterprise' category. For this reason, they did not include it in their analysis: 'Neither was the length of job experience in current enterprise included because a previous analysis of GPG decomposition indicated that the variable explains just under 1% of GPG only [Křížková et al., 2018]' (Křížková and Pospíšilová, 2023, p. 55).

[24] Another issue is that men are more likely to hold managerial positions than women. Yet, this fact has a negligible effect on the total GPG. According to Křížková et al. (2018, p. 77), women's weaker representation in management positions explains as little as 0.62 percentage points of the GPG.

[25] Goldin (2023, p. 4) reported that, for the US, different occupational choices of men and women explain about one-third of the GPG.

ers, library managers and prison governors. And in Group 26 are lawyers, chief justices, judges and notaries mixed together with archivists, art gallery curators, librarians, economic analysts, philosophers, priests and poets (International Labour Office, 2012, pp. 92–104, 158–168). The consequences of this method are obvious. By considering jobs in each group as the *same* from a statistical analysis perspective and by mixing well-paid and poorly paid or qualified and unqualified occupations in the same category, the analysis nullifies any differences between the occupations predominantly chosen by men and women. Of course, this resulted in zero explanatory power for the GPG. Additionally, by valuing this factor as a negative value, Eurostat (once again) increased the unexplained part of the GPG.

Completely different results were obtained when finer-grained differentiation using the four-digit ISCO was used. This commendable choice was made by Křížková and Pospíšilová (2023, pp. 45–46), who concluded that based on this finer-grained classification, the occupational choice factor can explain about half of the GPG.

Nevertheless, even this differentiation is merely an approximation and obviously does not provide a complete picture of reality. With this differentiation, we arrive at the level of pay gaps between female and male doctors at a given hospital, female and male teachers at a given school, female and male cooks at a given restaurant, female and male lawyers at a given law firm, etc.[26] As shown by Farrell (2005) with US data, a large part of a GPG found within the same occupation at the same workplace can be explained by different *specialisations* and other factors, such as length of job experience, hours actually worked, level of risk involved (even at the same position), responsibility level (even at the same position), standby duties vs. the ability to mentally detach from work, willingness to work longer hours or return to work in case of unforeseen situations[27] (again, all at the same position[28]), amount of further education required for one's specialisation, etc. Including these factors would further reduce the level of the AGPG.

Farrell (2005) illustrated this with a 20% gender pay gap in the US medical profession. The gap was reduced to 2% when doctors with the *same speciality* were compared (Farrell, 2005, p. 75). Teachers in the US provided a similar example. Their annual earnings were 46,000 USD among men and 42,000 USD among women—a sizeable GPG. However, a closer look revealed that male teachers worked, on average, two hours a week more than female teachers, had a 25% larger share of workers with 20+ years of job experience and exhibited, on average, a 10% longer job experience with their current employer (Farrell, 2005, p. 77).

[26] The authors defined men and women working at the same positions as 'working at the same workplace and in the same four-digit category of the CZ-ISCO occupational classification' (Křížková & Pospíšilová, 2023, p. 41).
[27] See Bolotnyy and Emanuel (2022).
[28] In line with Křížková and Pospíšilová (2023), 'same position' is understood here as a combination of the same workplace and the same occupational category.

The relationship between hours worked and wages is not a linear function

Converting total wages to hourly earnings can introduce significant bias in the AGPG calculation. This is due to the non-linear relationship between working time and wages, especially in skilled occupations, which have a higher gap than unskilled jobs. Goldin (2023) provided an example of this phenomenon in the legal profession:

> The average lawyer who works sixty hours a week earns more than two and a half times what the lawyer working thirty hours a week earns. That jump in earnings with time occurs without regard to gender.[29] Both male and female lawyers earn significantly more per hour when their overall hours increase (…) When a lawyer's hours increase from thirty to sixty per week, the average hourly rate increases by almost a quarter. The more hours per week that lawyers work, the more *each of their hours* spent working is worth. If we hold hours worked constant for men and women, there is no gender component to the discrepancy. We know the difference between what the genders earn is significant. But … the underlying cause of the gap is not their gender (Goldin 2023, pp. 180–181).

Farrell (2005, pp. 78–79) demonstrated this principle of non-linear dependence using data from the US Bureau of Labour Statistics (2003), but he extended it beyond the legal profession. The data show that an individual working 45 hours per week earns 44% more than someone working 40 hours per week (Farrell, 2005, p. 78). This means that a 13% increase in working hours results in a 44% increase in total wages. Importantly, this pay difference is not based on gender but rather on the number of hours worked. However, according to the US Bureau of Labor Statistics (2003), men in the US actually work an average of 45 hours per week, while women work an average of 42 hours per week. What does that three-hour difference amount to in pay? 'The average person [regardless of gender] who works 45 hours per week earns 14% more than the 42-hour per week worker' (Farrell, 2005, pp. 78–79). Thus, there was an approximately 6% difference in hourly wages between the two groups.

It is likely that even in the Czech Republic the relationship between wage level and hours worked is not linear. The fact that men work longer per week (36.5 hours versus 32.3 hours; for the same hours [i.e. full-time job], the difference is 37.2 hours versus 34.2 hours [CZSO, 2022a, Chapters 4.7, p. 218]), means that not only are their total wages higher, but their *hourly* wages are also significantly higher. However, this is not because they are men but because they work longer hours per week and the relationship between real hours and wages is non-linearly increasing. Since the adjusted pay gap analyses, which compare the

[29] For example, if one lawyer earns $1,000 for 30 hours and another lawyer earns $2,500 (not $2,000) for 60 hours, there is a 20% difference in their hourly earnings without any form of discrimination (gender or otherwise). Note: PK.

hourly earnings of men and women, proceed by simply dividing total wages by the number of hours worked, an implicit linear relationship between wages and hours worked is assumed. The logical result of this operation (the assumption of a linear relationship between wages and real hours worked) is that it follows that an hour of male work is worth more than an hour of female work, and this is then misinterpreted as wage discrimination against women, even though, to recall Goldin's (2023) statement, 'there is *no gender component to the discrepancy*' and the 'jump in earnings with time occurs *without regard to gender*' (Goldin 2023, pp. 180–181, emphasis ours).

Farrell (2005) concluded that 'it is possible that up to 70% of the [unadjusted] pay gap between men and women could be accounted for by differences in hours worked' (p. 79).

It would, of course, have to be rigorously calculated (on the basis of Czech data) exactly how much the erroneous implicit assumption of a linear relationship between the length of working time and the wage rate contributes to the overall virtual increase in the AGPG in the Czech Republic. However, given the US data, it is reasonable to assume that it is certainly not a small part.

A further bias in the AGPG level arises from the fact that the conversion to hourly wages is effectively made on the basis of the number of hours stated in the employment contract rather than the *actual* hours worked. This issue will be addressed in the next subsection.

Hours actually worked

Differences in the monthly number of hours worked are of utmost importance in explaining why women and men have different average earnings. At the same time, its erroneous use in the calculation of the AGPG causes the highest amounts of bias. Let us briefly look back at the category of *unadjusted* GPG (the difference between the average pay of women and men). While the CZSO quantified a gap in *monthly* pay, Eurostat quantified the gender gap in 'hourly earnings'. However, both result in almost the same amount of unadjusted GPG. The difference in monthly wages between men and women and in hourly wages is almost the same in both cases. More specifically, in its publication *Focus on Women and Men–2022*, Chapter 4.34, the CZSO (2022a, p. 240) defined the GPG as the difference in 'average gross monthly wages' and indicated values of 19.1% for 2019, 16.2% for 2020 and 15.2% for 2021. For the same years, Eurostat (2023) indicated practically equal numbers 'in *hourly* earnings': 19.2% for 2019, 16.4% for 2020 and 15.0% for 2021. One key fact emerges from these data: The difference between the monthly and hourly wage gaps was virtually non-existent (in the lower deciles of percentage points) in these analyses. In other words, the difference in that men work 8.6% longer than women on the same contract (CZSO, 2022a, Chapter 4.7, p. 218) was not involved in the calculation of the AGPG by Eurostat (see Table A1), Křížková

and Pospíšilová (2023), the Office of the Government (2021) and the Ministry of Labour and Social Affairs (2022).[30] This may not be immediately apparent, as these analyses rely on the number of hours worked by men and women and then convert them into hourly earnings. However, the reality is more complicated than this suggests. The data set is also affected by a significant limitation, which presents a significant obstacle to achieving a clear conclusion. Let us now provide a more detailed explanation.

Based on the Labour Force Sample Survey (LFSS), the CZSO (2022a, Chapter 4.7, p. 218) stated that men with the same contracted working time (full-time) work 3.2 hours per week more than women. A similar difference (~three hours a week) was also shown in the SILC data.[31] Thus, LFSS showed that women working full-time hours work 8.6% fewer hours than men working full-time hours (CZSO, 2022a, Chapter 4.7, p. 218).

Given an unadjusted gender gap in *monthly* pay of 15.2% in 2021 (CZSO, 2022a, p. 218) and the fact that women work 8.6% fewer hours than men with equal contracted working time, it is impossible to obtain an *hourly* GPG only 0.2% below the monthly gap (or to obtain even higher hourly GPGs for the previous years). Let us explain this discrepancy. Eurostat, Křížková and Pospíšilová (2023), the Ministry of Labour and Social Affairs (2022) and the Office of the Government (2021) all used data sourced from *employers*, whereas few Czech workplaces currently use punch clocks or maintain any records of hours actually worked. Therefore, Czech employers account for the hours worked by their employees based on the hours written in their *employment contracts* and not their *hours actually worked*. Therefore, their regular reports are based on the hours written in employment contracts and *recorded* leave from work or overtime hours (but again, most employers do not keep overtime records). This logically results in entirely negligible differences in hours worked by men and women with the same contracted working time: merely 1.3 hours per *month* or 0.75% (according to employer reports, Czech men worked 173.6 hours and women worked 172.3 hours per month in 2022; CZSO, 2022c). For the above reasons, these reports neglected the fact that men systematically work longer hours than women with the same contracted working time. Consequently, this statistic is highly biased in a situation when, according to the European Working Conditions Survey (2023), ~58% of men and ~40% of women are obliged to work in their free time. The following answers were obtained to the question, 'How often have you worked in your free time to meet work demands?': daily, 2% of men and 1% of women; several times a week, 7% of men and 4% of women; several times a month, 20% of men and 10%

[30] More precisely, these analyses used data on working hours, which show that the difference between men's and women's actual working hours is negligible. According to data used by analyses mentioned above, the difference is only 1.3 hours per month. According to the CZSOs, however, this difference is significantly higher. See below for more details.

[31] According to the EU–SILC 2013, Czech men worked, on average, 43.3 hours per week and women worked, on average, 39.9 hours per week.

of women; less often, 29% of men and 25% of women; and never, 42% of men and 60% of women (European Working Conditions Survey, 2023).

When the calculation of *hourly* AGPG is not based on hours *actually* worked but rather on employment contracts (i.e. monthly pay is practically divided by contracted working hours), the resulting AGPG will, of course, be significantly higher than what exists in reality.

The obvious questions remain about how men and women 'really' differ in their total hours worked and whether the calculation of the AGPG should be based on employer data (Trexima and SILC) or employee data (LFSS). There are problems with both approaches. Although subjective bias may affect employee data, since most employers do not keep records of hours actually worked, employee reports (CZSO, 2022a, p. 218) seem to provide a better picture of the hours actually worked. According to CZSO (2022a, p. 218), as stated above, women working full-time hours work 8.6% fewer hours than men with the same contracted working time (their actual working time is only 91.4% of men's).

Therefore, in order to answer the question of the level of the wage gap between men and women for the same work, it would be necessary to adjust the figure of 9% reported by Křížková and Pospíšilová (2023), supposedly for 'the same work', by firstly including the factor of the length of the difference in accumulated job experience between men and women; the difference in actual working hours between men and women with the same contractual working hours (i.e. using data that actually included this difference); and taking into account the non-linear relationship between wages and working hours.

Conclusion

Let us conduct a thought experiment. We will assume that a) two groups of workers (women and men) have the same productive characteristics, and b) there is perfect wage equality between them (i.e. they are paid only on the basis of their productive characteristics and not on any other factors, such as gender, sympathy, etc.), so there is no discrimination. Assuming that women and men have the same productive characteristics and that there is perfect pay equality between them, they should receive the same hourly wage. If both groups work for the same amount of time, they receive the same monthly wage. However, if one group works 8.6% longer than the other, they should receive 8.6% more pay than the other group, assuming equal pay. This is almost exactly the pay gap that exists between the two groups to which Křížková and Pospíšilová (2023) are referring (if we disregard the difference in actual hours worked between men and women, because the data from the employers, as we have seen, do not include the difference in actual hours worked). [32]

[32] Křížková and Pospíšilová (2023) suggest that there is a 9% wage gap, which they interpret as the difference in remuneration between women and men *for the same work* (Kříž-

It should be noted that the men's group has, on average, four more years of total job experience. Additionally, an extra year of experience increases the wage rate by 1.1%. Consequently, the group with one more year of experience should, on average, earn 1.1% more than the other group. If the more experienced group has a total of four more years of experience, it should earn 4.4% more than the other group (assuming that both groups have the same other productive characteristics and that there is no gender discrimination).

As we have shown, the fact of a non-linear function between wage level and hours worked also has a very significant effect, explaining a significant part of the GPG (and thus reducing the unexplained part of GPG).

Considering these factors (i.e. the difference in real working time, the difference in length of experience between both groups and non-linear function between hours actually worked and salary), it seems *highly unlikely* that there is (in reality) any remaining space for 'unequal pay for equal work' between the two groups. Naturally, this hypothesis must be empirically proven and calculated (which will be done in the next paper; this paper deliberately focuses only on *critical* aspects of existing measurements of the AGPG). However, if the gender pay gap for equal work persists, it is likely to be an extremely small part of the unadjusted gender pay gap. This point has been well expressed by recent Nobel Laureate Claudia Goldin (2023):

> Are women actually receiving lower pay for equal work? By and large, not so much anymore. Pay discrimination in terms of unequal earnings for the same work accounts for a small fraction of the total earnings gap. Today, the problem is different. (Goldin 2023, p. 4)

We have addressed the calculation of the explained and unexplained parts of the gender pay gap in the Czech Republic by analysing the different factors influencing the size of both parts. Existing studies indicate that one-third[33] or at most one-half of the unadjusted GPG can be explained by the different productive characteristics of men and women (Křížková & Pospíšilová, 2023, p. 45). The

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ková and Pospíšilová, 2023, p. 54). We respectfully disagree with this interpretation, as we believe it may be premature and potentially misleading. It would be inaccurate to say that their analysis showed that women and men receive different pay for the same work. Rather, it demonstrated a gender pay gap for workers of the same occupational category, age, workplace, and type of contracted working time (full-time hours). It is important to note that significant gender differences were not considered in their analysis. These include total length of job experience, hours *actually* worked, position within the company, and specialization within the occupational category. For this reason, we believe that their conclusion that there is unequal pay for equal work may not be fully supported and requires further analysis.

[33] '... there is still a so-called "unexplained" gender pay gap, which accounts for two-thirds of the gender pay gap in the EU Member States' (European Commission, 2021, p. 3).

other unexplained half represents (as standardly interpreted) discrimination in pay for equal work or for work of equal value. The AGPG value of 9%–11% for the Czech Republic indicated by these studies was incorporated into the work of the Czech Government[34] and is understood therein as unequal pay for equal work. The assumption of wage discrimination also occurred in a European Commission document aimed at addressing 'pay discrimination and bias in pay structures' (European Commission, 2021, p. 3).

As previously demonstrated, conclusions about high levels of unequal pay for women for the same work or work of equal value are presented as undeniable facts of current social reality. However, they are based on several problematic assumptions that artificially increase the adjusted gender pay gap in statistical analyses. It seems evident that the three main factors that determine wage levels are occupational choice, total length of experience and number of hours worked. These productive characteristics significantly differentiate working men and women. If Eurostat effectively nullifies all three of these factors or even considers their contribution to the explained part of the gender pay gap negative (see above), it is not surprising that the result of such an analysis is that the size of the explained part of the gender pay gap is negligible, while the size of the unexplained part (i.e. AGPG) is extremely high. Given that the conclusions drawn in this manner form the basis of European and national policies aimed at addressing gender pay inequality, it is desirable that the resulting conclusions of the analyses are as close to reality as possible. Therefore, the aims of this article were to highlight these problematic aspects of the AGPG calculation and to provide a theoretical and conceptual criticism of them. This critique is not an end in itself. It is a preparation for more detailed empirical modelling, which should show what the actual AGPG is, whether the relevant parameters were considered and whether the biases described in this paper were eliminated. The theoretical analysis carried out here will therefore be followed by a systematic empirical and analytical analysis that should more accurately and rigorously quantify the true AGPG and the actual impact of each variable.

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