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## Wage inequalities in Poland — section approach

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**Słowa kluczowe:** wynagrodzenie, nierówność, sekcje PKD

**Abstract:** The aim of the paper was to determine wage inequalities between the PKD sections in Poland. The research was based on the data on average wages published by Polish Central Statistical Office in 2009 and 2018. Descriptive statistics were used as well as statistical significance tests to compare the data. All hypotheses were verified positively. Wage inequalities occurred between all the PKD sections. In 2018 they were lower than in 2009. At the same time the phenomenon was changeable. Furthermore, with the use of the Wilcoxon signed-ranked, it was concluded that wage inequalities in 2009 and 2018 were similar.

### Nierówności wynagrodzeń w Polsce — ujęcie sekcyjne

**Abstrakt:** Celem artykułu było określenie, jak kształtowała się nierówność wynagrodzeń pomiędzy sekcjami PKD w Polsce. Badanie zostało oparte na danych o przeciętnym wynagrodzeniu opublikowanych przez Główny Urząd Statystyczny za lata 2009 i 2018. Do ich porównań wykorzystano statystykę opisową oraz statystyczne testy istotności. Pozytywnie zweryfikowano wszystkie hipotezy. Nierówność wynagrodzeń występowała pomiędzy wszystkimi sekcjami PKD. W 2018 roku była ona niższa niż w 2009. Tym samym jest to zjawisko zmienne. Ponadto, wykorzystując test rang Wilcoxona, ustalono, że nierówność wynagrodzeń w latach 2009 i 2018 kształtowała się podobnie.

### Introduction

Differentiation is a phenomenon related to the differences that occur between examined subjects. One of the numerous examples is the differentiation of wages. This phenomenon — common in the economy — is a consequence of the remuneration policies run by companies to reward their employees. Differentiation of wages enables companies to perform the motivation function of remuneration.

Undoubtedly, differentiation of wages is connected with inequality. Moreover, inequality of wages only occurs when they are different. The subject literature presents a number of research findings on differentiation of wages taking into consideration the gender of the receiver, geographical distribution, the ownership sector or the Polish Classification of Activities (PKD). They provide the answer on how wages are shaped. However, the answers related to wage inequality determined by its differentiation are few or ambiguous. Therefore, in this article, to bridge the research gap, the research question was formulated as follows:

1. Did wage inequality occur between all the PKD sections?
2. Did wage inequality between particular sections of the PKD change?
3. What were the wage inequalities in 2009 and 2018?

This paper aims to determine the types of wage inequalities which existed between PKD sections in Poland in 2009 and 2018. The following statements are the research hypotheses put forward to achieve the research goal:

1. Wage inequality occurred between all the PKD sections.
2. Wage inequality between the PKD sections was a variable phenomenon.
3. Wage inequalities for the years 2009 and 2018 were similar.

The methods applied to verify these hypotheses involved a critical analysis of the literature as well as statistical significance tests. This article consists of four sections. The first section presents a review of the literature, the second describes the methodology of research, the third shows the results of analysis and the last section presents some conclusions.

## 1. Wages as the subject of research on economic inequalities

Wage is a broad concept. Very often, both in the popular and subject literature this term is interchangeable and replaced by the term ‘payment’. This makes the issue more complex. It is worth noting that in Poland payment is an element of remuneration, thus it is viewed as a narrower concept. In turn, in the English language literature, due to some kind of bridging of historical divisions between employees, these concepts are understood as almost equivalent. Therefore, in the subject literature general definitions of wages or payments have the same meaning. Depending on the perspective adopted, wage might be perceived differently. For entrepreneurs it constitutes the cost arising from the recruitment of employees.<sup>1</sup> For employees it is their income from self — employment.<sup>2</sup> But for these two parties wage is the price of labor — for an enterprise it is the price of purchase,

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<sup>1</sup> M. Wojas, *Wynagrodzenia i inne świadczenia na rzecz pracowników: dokumentacja i ewidencja księgową*, Stowarzyszenie Księgowych w Polsce, Instytut Certyfikacji Zawodowej Księgowych, Warszawa 2011, p. 10.

<sup>2</sup> E.S. Phelps, *Rewarding Work*, Cambridge, MA-London 2007, p. 37.

while for the employee it is the price of sale.<sup>3</sup> In the management theory of human resources, apart from material aspects, a definition of wage takes into account also non-financial elements that is jointly referred to as so-called total remuneration.<sup>4</sup>

To material remuneration, i.e., a transaction contract arising from the contract between the employer and the employee, belong: a gross salary and an employee's extra benefits. Non-financial remuneration, so called relational compensation, refers to the opportunity to gain knowledge, skills and professional experience within the organization.<sup>5</sup> Wages play a number of important roles in the economy. They might be divided into four basic ones. For the enterprise, wages mean costs that reduce revenues gained from sales, thus, performing then the cost function. For the employees, wages are an important source of income. In this way the income function is carried out which allows one to determine social status — wages perform the social function. Wages also provide a stimulus for the enterprise to shape employees' behaviors and attitudes so, at the same time, to fulfill the motivation function.<sup>6</sup>

As B. Radzka points out, wage differentiation is intentional and is one of the tools used by companies to perform the motivation function.<sup>7</sup> Differentiation occurs where the entities differ from each other in terms of certain characteristics. The PWN Polish dictionary, defines differentiation as diversity.<sup>8</sup> Social differentiation discussed in the paper might be determined by the difference in, among others, education, position held, exercising official authority, participation in culture, income and remuneration.<sup>9</sup> Wage inequality occurs when their differentiation is observed. Although these phenomena are interpreted in a similar way, it should be clearly stated that it is differentiation that determined inequality, and not the other way round. The subject literature dedicates a great deal of attention to the description and study of wage differentiation. Spatial and cross-section research was conducted, among others, by P. Adamczyk, whose conclusions clearly confirm the existence of such phenomenon in Poland.<sup>10</sup> Differences in the level of wages

<sup>3</sup> P.A. Samuelson, W.D. Nordhaus, *Ekonomia 2*, Warszawa 2004, p. 85.

<sup>4</sup> T.M. Manus, M.D. Graham, *Creating a Total Rewards Strategy*, New York 2003.

<sup>5</sup> M. Armstrong, *A handbook of employee reward management and practice*, London 2007, p. 43.

<sup>6</sup> T. Kawka, "Wynagrodzenia w organizacjach nowej gospodarki: uwarunkowania, funkcje, konfiguracja", *Monografie i Opracowania Uniwersytetu Ekonomicznego we Wrocławiu* 2014, no. 250, pp. 204–222.

<sup>7</sup> B. Radzka, "Zróżnicowanie wynagrodzeń w perspektywie sprawiedliwości dystrybucyjnej", *Zarządzanie Zasobami Ludzkimi* 73, 2010, no. 2, p. 50.

<sup>8</sup> <https://sjp.pwn.pl/szukaj/zr%C3%B3%C5%BCnicowanie.html> (accessed: 4.05.2020).

<sup>9</sup> M. Malikowski, "Przestrzenne aspekty zróżnicowania społecznego. Główne tezy i problemy badawcze", *Ruch Prawniczy, Ekonomiczny i Socjologiczny* 53, 1991, issue 1, pp. 183–184.

<sup>10</sup> P. Adamczyk, "Tendencje w poziomie i zróżnicowaniu wynagrodzeń w Polsce po przystąpieniu do Unii Europejskiej", *Ekonomika i Organizacja Gospodarki Żywnościowej* 2008, no. 72, p. 19.

between the regions in Poland based on gender are also confirmed by the research conducted by A. Łopatka. Additionally, the author notes that wage differentiation results from autonomic function of the market and depends largely on the competitive position of the region and entities.<sup>11</sup> G. Przekota points out that wage differentiation is affected by unemployment and the level of the sold production in industry. The author also positively confirms his hypothesis which assumes that joint government policy and market mechanisms impact positively on diminishing differences in wages, although still not well enough to eliminate them all.<sup>12</sup> P. Antoszak also claims that wages in particular regions, sectors and professional groups in Poland vary significantly. In his research, he found out that between 2006 and 2015, year by year, the growth in wages was lower.<sup>13</sup>

Differentiation determines inequality. In the subject literature inequality is most often defined as the lack of equality. It is present between single entities as well as between groups of entities. The way this concept is perceived was presented both in Polish and English — language studies conducted, among others, by P.L. Carter and S. F. Reardon,<sup>14</sup> J.A. Charles-Coll,<sup>15</sup> J. Filek,<sup>16</sup> S.M. Kot,<sup>17</sup> M. Raczkowska,<sup>18</sup> L.S. Temkin,<sup>19</sup> M. Tomczek.<sup>20</sup> Inequality is a multidisciplinary concept. This thesis was put forward on the basis of definitions presented by the PWN Polish dictionary<sup>21</sup> as well as Oxford Dictionaries<sup>22</sup> according to which inequality is common in natural sciences, humanities and social sciences. This fact determines a high number of possible kinds of inequalities. Therefore, as A. Sen emphasizes in the research process the researcher should be aware that there is a need to ask the question ‘equality of what?’ so that they may specify the type of the re-

<sup>11</sup> A. Łopatka, “Poziom i przyczyny różnicowania wynagrodzeń w Polsce”, *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu* 2015, no. 401, p. 251.

<sup>12</sup> G. Przekota, “Ocena poziomu i przyczyn zróżnicowania wynagrodzeń w Polsce”, *Roczniki Ekonomiczne Kujawsko-Pomorskiej Szkoły Wyższej w Bydgoszczy* 2016, no. 9, pp. 401–402.

<sup>13</sup> P. Antoszak, “Poziom i przyczyny zróżnicowania wynagrodzeń w Polsce”, *Mysł Ekonomiczna i Polityczna* 2017, no. 4 (59), p. 182.

<sup>14</sup> P.L. Carter, S.F. Reardon, *Inequality Matters*, William T. Grant Foundation Paper, New York 2014, p. 3.

<sup>15</sup> J.A. Charles-Coll, “Understanding income inequality: concept, causes and measurement”, *International Journal of Economics and Management Sciences* 2011, no. 1 (3), p. 17.

<sup>16</sup> J. Filek, “Rozważania wokół nierówności”, *Prakseologia* 2014, no. 156, pp. 283–295.

<sup>17</sup> S.M. Kot, “Nierówności ekonomiczne i społeczne a zasady sprawiedliwości dystrybucyjnej”, *Nierówności Społeczne a Wzrost Gospodarczy* 2004, no. 4, pp. 46–48.

<sup>18</sup> M. Raczkowska, “Nierówności dochodowe w Polsce w relacji miasto–wieś”, *Ekonomika i Organizacja Gospodarki Żywnościowej* 2015, no. 112, pp. 7–18.

<sup>19</sup> L.S. Temkin, *Inequality*, New York-Oxford 1993, pp. 7–18.

<sup>20</sup> M. Tomczek, “Nierówności ekonomiczne jako kategoria opisowa i normatywna”, *Studia Ekonomiczne* 2017, no. 334, pp. 7–21.

<sup>21</sup> <https://sjp.pwn.pl/sjp/niernowosc;2489688.html> (accessed: 4.05.2020).

<sup>22</sup> <https://en.oxforddictionaries.com/definition/inequality> (accessed: 4.05.2020).

searched inequality.<sup>23</sup> One should also remember that equality is distinct from identity. P. Ulman and A. Wałęga notice that inequality occurs where entities or groups of entities differ in terms of a given specific feature, and not in terms of all their characteristics.<sup>24</sup> The subject of inequality is determined by its type. M. Wójcik-Żołądek claims that due to the nature of the subject, three dimensions of inequality may be distinguished in the area of social sciences, i.e., political, social and economic.<sup>25</sup> One example of economic inequality is inequality arising from the lack of equality in the pay for work, referred to as wage inequality. Inequality, including wage inequality, is highly debatable. The subject literature refers to three groups with different approaches toward this phenomenon. Representatives of elitism accept wage inequality, arguing it should be justified by inequality among persons. Meritocrats accept inequalities of wages that arise from individual efforts made by entities, whereas proponents of egalitarianism support absolute equality between entities.<sup>26</sup>

In conclusion, wage inequalities are commonplace, as is common their differentiation. Inequality in wages is not fully accepted; in the subject literature there are numerous examples of mutually exclusive statements related to this issue. However, this phenomenon is inherent in the market economy where wages shape certain expected employee's behaviors.

## 2. Research methodology

The data used in the analysis was the statistical data on average monthly gross wage and salaries per one employee (the 'wage') published by the Polish Central Statistical Office (GUS) for the years 2009 and 2018. The research takes into account the division into PKD sections. The research aimed at identifying wage inequalities between particular sections and to compare their size and distribution. The method employed to determine wage inequalities in a given year was the following. Wages from all the PKD sections were ranked according to their value, from the lowest to the highest, and they were also the dividend and the divisor. Then they were listed in tabular format where the dividend was presented vertically and the divisor — horizontally. The values were divided to obtain the quotient. This method is a type of pay gap.<sup>27</sup> The ratios left in the table are those where the

<sup>23</sup> A.K. Sen, *Nierówności: dalsze rozważania*, Kraków 2000, p. 9.

<sup>24</sup> P. Ulman, A. Wałęga, "Nierówności dochodowe w Polsce i ich dekompozycja", *Zeszyty Naukowe Polskiego Towarzystwa Ekonomicznego* 2006, no. 4, p. 4.

<sup>25</sup> M. Wójcik-Żołądek, "Nierówności społeczne w Polsce", *Infos. Zagadnienia społeczno-gospodarcze* 2013, no. 20, p. 1.

<sup>26</sup> M. Bąk, "Egalitarny model kształcenia w perspektywie społeczeństwa wiedzy", *Zeszyty Naukowe. Organizacja i Zarządzanie* 2016, no. 95, pp. 15–16.

<sup>27</sup> A. Smóder, J. Mirosław, "Łuka płacowa (*gender pay gap*). Pojęcie, metody pomiaru, sposoby ograniczania", *Zarządzanie Zasobami Ludzkimi* 2016, no. 3–4 (110–111), p. 27.

dividend was greater than zero (in the scheme — bold ratios). Where the quotient was less than 1, the results were not presented as the interpretation was identical. The results achieved were subject to further analyses. An illustrative scheme of the method utilized in the research is presented in Table 1.

Table 1. Scheme of the method used to determine inequality

Specification		a	b	c
		Divisor		
a	Dividend	1	a/b	a/c
b		<b>b/a</b>	1	b/c
c		<b>c/a</b>	<b>c/b</b>	1

a, b, c — wages from a particular PKD section

Source: own study.

To determine potential differences or similarities in wage inequalities, five ratios between sections — the highest and the lowest — were chosen from the received data for the years 2009 and 2018. In addition, measures of descriptive statistics were assessed median, the first quartile, median, the third quartile and average. For a more profound analysis, the research on the similarity of wage inequality distribution from 2009 and 2018 was conducted. For this purpose, using the Kolmogorov-Smirnov test, it was determined if they were of normal distribution character. It was followed by two non-parametric tests for dependent samples, i.e., the Wilcoxon signed — ranked test. The assumed level of significance was p-value 0.05.

### 3. Results

The aim of the research was to determine wage inequalities between the PKD sections in Poland. The research utilized the data related to 19 sections. The mathematical operation described in the research methodology allowed us to obtain 171 observations for the years 2009 and 2018. The results are presented in Table 2 and Table 3 for 2009 and 2018, respectively.

No relation that would have a value of 1 was observed between particular sections in 2009. This means no equality was identified. It allows for an unequivocal statement that in 2009 wage inequality occurred between particular sections. The same was identified for the year 2018.

In 2009 the highest wage inequality occurred between the following sections:

1. Mining and quarrying — Accommodation and catering (2.976);
2. Financial and insurance activities — Accommodation and catering (2.782);
3. Information and communication — Accommodation and catering (2.776);
4. Mining and quarrying — Administrative and support service (2.774);
5. Financial and insurance activities — Administrative and support service activities (2.593).

The lowest wage inequality in 2009 was diagnosed between:

1. Human health and social work activities — Water supply, sewerage, waste management and remediation activities (1.0002);
2. Financial and insurance activities — Information and communication (1.002);
3. Public administration and defense; compulsory social security — Professional, scientific and technical activities (1.012);
4. Agriculture, forestry and fishing — Transportation and storage (1.015);
5. Trade; repair of motor vehicles — Other service activities (1.022).

In 2018 the highest wage inequality was observed between the following sections:

1. Information and communication — Accommodation and catering (2.690);
2. Mining and quarrying — Accommodation and catering (2.594);
3. Financial and insurance activities — Accommodation and catering (2.515);
4. Electricity, gas, steam and air conditioning supply — Accommodation and catering (2.478);
5. Information and communication — Administrative and support service activities (2.343).

In turn, wage inequality with the lowest level in 2018 was identified between the following sections:

1. Human health and social work activities — Manufacturing (1.002);
2. Trade; repair of motor vehicles — Transportation and storage (1.004);
3. Education — Human health and social work activities (1.015);
4. Financial and insurance activities — Electricity, gas, steam and air conditioning supply (1.015);
5. Education — Manufacturing (1.016).

The analysis of the five highest and lowest wage inequalities allows the following conclusions. In the case of the highest inequalities, three ratios were repeated in 2018 with other values also occurring in 2009. This is true for the ratios between sections: Mining and quarrying, Financial and insurance activities, Information and communication against Accommodation and catering. Although the order and the value of particular ratios were changed, it should be noted that this group of inequalities is relatively stable. A different situation was diagnosed in the case of the five lowest inequalities from 2009 and 2018. No repetition of ratios in sections between the lowest inequality occurred was diagnosed. Yet, there was a decrease (in value terms) of the five lowest inequalities in 2018 compared with 2009. What is more, the decrease in wage inequalities in 2018, compared with 2009, is confirmed by the measures of descriptive statistics, which is presented in Table 4. In 2018, the first, second and third quartile as well as the average were lower than in 2009. However, these falls were minimal as they did not exceed 5%.

Table 2. Wage inequality in 2009 — section approach

Specification	Divisor																			
	-9-	-14-	-19-	-7-	-6-	-3-	-18-	-8-	-1-	-5-	-17-	-16-	-12-	-13-	-15-	-4-	-10-	-11-	-2-	
-9-																				
-14-	1.070																			
-19-	1.298	1.210																		
-7-	1.327	1.237	1.022																	
-6-	1.387	1.292	1.068	1.045																
-3-	1.442	1.344	1.110	1.087	1.040															
-18-	1.488	1.387	1.146	1.121	1.073	1.032														
-8-	1.524	1.420	1.173	1.148	1.099	1.057	1.024													
-1-	1.547	1.442	1.191	1.166	1.116	1.073	1.040	1.015												
-5-	1.599	1.490	1.231	1.205	1.153	1.109	1.074	1.049	1.033											
-17-	1.599	1.490	1.231	1.205	1.153	1.109	1.075	1.049	1.034	1.0002										
-16-	1.649	1.537	1.270	1.242	1.189	1.143	1.108	1.082	1.066	1.031										
-12-	1.699	1.583	1.308	1.280	1.225	1.178	1.142	1.115	1.098	1.063	1.062	1.030								
-13-	2.071	1.930	1.595	1.561	1.494	1.437	1.392	1.359	1.339	1.296	1.295	1.256	1.219							
-15-	2.096	1.954	1.614	1.580	1.512	1.454	1.409	1.376	1.355	1.311	1.311	1.271	1.234	1.012						
-4-	2.540	2.367	1.956	1.914	1.831	1.761	1.707	1.667	1.642	1.589	1.588	1.540	1.495	1.226	1.211					
-10-	2.776	2.587	2.138	2.092	2.002	1.925	1.866	1.822	1.794	1.737	1.736	1.684	1.634	1.340	1.324	1.093				
-11-	2.782	2.593	2.143	2.097	2.006	1.930	1.870	1.826	1.798	1.740	1.740	1.687	1.638	1.343	1.327	1.096	1.002			
-2-	2.976	2.774	2.292	2.243	2.146	2.064	2.000	1.953	1.924	1.862	1.861	1.805	1.752	1.437	1.420	1.172	1.072	1.070		

Source: own study based on the Central Statistical Office of the Polish Republic (GUS) 2010 and 2019.

Table 3. Wage inequalities in 2018 — section approach

Specification	Divisor																		
	-9-	-14-	-19-	-6-	-8-	-7-	-18-	-5-	-3-	-17-	-16-	-12-	-1-	-15-	-13-	-4-	-11-	-2-	
-9																			
-14		1.148																	
-19		1.209	1.053																
-6		1.278	1.114	1.057															
-8		1.340	1.167	1.108	1.048														
-7		1.345	1.172	1.113	1.052	1.004													
-18		1.369	1.193	1.132	1.071	1.022	1.018												
-5		1.444	1.257	1.194	1.129	1.077	1.073	1.054											
-3		1.471	1.281	1.216	1.150	1.098	1.093	1.074	1.019										
-17		1.473	1.283	1.219	1.152	1.100	1.095	1.076	1.021	1.002									
-16		1.495	1.302	1.236	1.169	1.116	1.111	1.092	1.036	1.016	1.015								
-12		1.584	1.379	1.310	1.239	1.182	1.177	1.157	1.097	1.077	1.075	1.059							
-1		1.634	1.423	1.351	1.278	1.220	1.215	1.193	1.132	1.111	1.109	1.093	1.032						
-15		1.854	1.615	1.534	1.450	1.384	1.378	1.354	1.284	1.261	1.259	1.240	1.171	1.135					
-13		1.953	1.701	1.616	1.528	1.458	1.452	1.427	1.353	1.328	1.326	1.307	1.233	1.195	1.053				
-4		2.478	2.158	2.049	1.938	1.849	1.842	1.810	1.716	1.685	1.682	1.657	1.565	1.516	1.336	1.268			
-11		2.515	2.191	2.080	1.967	1.877	1.870	1.837	1.742	1.710	1.707	1.683	1.588	1.539	1.357	1.288	1.015		
-2		2.594	2.260	2.146	2.029	1.936	1.929	1.895	1.797	1.764	1.761	1.736	1.638	1.588	1.399	1.328	1.047	1.031	
-10		2.690	2.343	2.225	2.104	2.008	2.000	1.965	1.863	1.829	1.826	1.799	1.699	1.646	1.451	1.377	1.086	1.069	1.037

Source: own study based on the Central Statistical Office of the Polish Republic (GUS) 2010 and 2019.

Key for Table 1 and 2

PKD Section: 1 — Agriculture, forestry and fishing; 2 — Mining and quarrying; 3 — Manufacturing; 4 — Electricity, gas, steam and air conditioning supply; 5 — Water supply, sewerage, waste management and remediation activities; 6 — Construction; 7 — Trade; repair of motor vehicles; 8 — Transportation and storage; 9 — Accommodation and catering; 10 — Information and communication; 11 — Financial and insurance activities; 12 — Real estate activities; 13 — Professional, scientific and technical activities; 14 — Administrative and support service activities; 15 — Public administration and defence; compulsory social security; 16 — Education; 17 — Human health and social work activities; 18 — Arts, entertainment and recreation 19 — Other service activities.

2.478
1.002

High level of inequality

Low level of inequality

Table 4. Wage inequalities in 2009 and 2018

Specification	2009	2018	Adjustment
Quartile I	1.140	1.115	-2.8%
Median	1.359	1.328	-3.1%
Quartile III	1.738	1.700	-3.8%
Mean	1.486	1.439	-4.7%

Source: own study.

To develop the research further, a distribution analysis was performed with the use of statistical significance tests. The aim was to determine if wage inequalities were the same in 2009 and in 2018. In the first place, the normality of distribution was established. To do this, the Kolmogorov -Smirnov test was applied. The achieved results indicate that the distribution is not normal — the statistical value for wage inequality in 2009 is 0.126 p-value 0.000, while in 2018 it is 0.136 p-value 0.000. As p-value (significance) is less than 0.05 (the assumed significance level) it is possible to reject the null hypothesis assuming normal distribution.

Due to the fact that the normal distribution test confirms that the data distributions are not normal, the author had to use non-parametric tests — the Wilcoxon signed — ranked tests for dependent samples. Significance for the Wilcoxon signed — ranked test is 1.905. As the identified significance is greater than the assumed level of significance (p-value 0.05), it is not possible to reject the null hypothesis that assumes the similarity of the distribution of wage inequalities in 2009 and 2018. The null hypothesis should be accepted.

In the author's opinion, the basic reasons for the identified inequality are, as follows, the pay system and level of technology in particular sections of the Polish economy. The highest inequalities were diagnosed between sections where the pay system is warranted by powerful trade unions (for example Mining and quarrying and Electricity, gas, steam and air conditioning supply) or determined by high technology, which require workers with unique qualifications (for example Information and communication and Financial and insurance activities), and the section where enumerate factors do not exist (for example Accommodation and catering and Administrative and support service activities). However, the lowest inequalities occurred where the trade unions have the same power (for example Mining and quarrying — Electricity, gas, steam and air conditioning supply) or applied technology is on the same level (for example Agriculture, forestry and fishing — Education) or both of these factors (for example Information and communication — Financial and insurance activities).

## Conclusions

The research conducted on wage inequalities between the particular PKD sections allowed us to achieve the aim of this paper, to answer the research questions, and to verify the hypotheses presented on the basis of the literature review.

In all the examined cases, there was the lack of equality between wages in particular sections. This situation occurred both in 2009 and 2018. It allows us to positively verify the assumed hypothesis that there are inequalities between all the sections.

The research identified the differences between the size of wage inequalities in 2009 and 2018. This allowed us to positively verify the hypothesis that inequalities were subject to changes. However, the differences observed were minimal. It is confirmed by the analysis conducted with the use of descriptive statistics as well as the analysis of its highest and lowest levels. The analysis of the five highest wage inequalities showed 60% cover of the same PKD sections, where the inequality occurred in 2009 and 2018. It means that over ten years, despite the changes of the values in absolute terms, the ratios between particular PKD sections were maintained. In the case of the five lowest inequalities such a situation was not identified.

The results of the tests carried out — the Wilcoxon signed — ranked test allowed us to assume the null hypothesis that there is a similarity in wage inequalities in 2009 and 2018. It means a positive verification of the hypothesis that inequalities in 2009 and 2018 were similar.

In conclusion, wage inequality is commonplace. It also occurs between wages in particular PKD sections. It results from the differentiation in the level of wages, which was proved in the subject literature. It should be noted, however, that wage inequality is not a phenomenon undergoing dynamic changes. This statement is confirmed by the low level of its changes over a period of ten years as well as by the comparability of the distributions between 2009 and 2018.

The results of research which were presented in this article fill the gap in the science literature. Heretofore inequality of wages was analysed between white-collar workers and blue-collar workers, workers with high and low qualifications, or men and women. It was confirmed that the wage of a well-educated office worker was higher than the wage of a low-skilled manual labourer, and wages of men was higher than women.<sup>28</sup> In this article a new approach to this issue is shown, based on a different type of data analysis. The data is linked to wages in particular sections of the Polish economy, not to the type or characteristic of workers. This is the value added to this article.

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<sup>28</sup> B. Radzka, *op. cit.*, pp. 65–68.

## References

- Adamczyk P., "Tendencje w poziomie i zróżnicowaniu wynagrodzeń w Polsce po przystąpieniu do Unii Europejskiej", *Ekonomika i Organizacja Gospodarki Żywnościowej* 2008, no. 72.
- Armstrong M., *A handbook of employee reward management and practice*, London 2007.
- Antoszak P., "Poziom i przyczyny zróżnicowania wynagrodzeń w Polsce", *Mysł Ekonomiczna i Polityczna* 2017, no. 4 (59).
- Bąk M., "Egalitarny model kształcenia w perspektywie społeczeństwa wiedzy", *Zeszyty Naukowe Organizacja i Zarządzanie* 2016, no. 95.
- Carter P.L., Reardon S.F., *Inequality Matters*, William T. Grant Foundation Paper, New York 2014.
- Charles-Coll J.A., "Understanding income inequality: concept, causes and measurement", *International Journal of Economics and Management Sciences* 2011, no. 1 (3).
- Filek J., "Rozważania wokół nierówności", *Prakseologia* 2014, no. 156.  
<https://en.oxforddictionaries.com/definition/inequality> (accessed: 4.05.2020).  
<https://sjp.pwn.pl/sjp/nierownosc;2489688.html> (accessed: 4.05.2020).  
<https://sjp.pwn.pl/szukaj/zr%C3%B3%C5%BCnicowanie.html> (accessed: 4.05.2020).
- Kawka T., "Wynagrodzenia w organizacjach nowej gospodarki: uwarunkowania, funkcje, konfiguracja", *Monografie i Opracowania Uniwersytetu Ekonomicznego we Wrocławiu* 2014, no. 250.
- Kot S.M., "Nierówności ekonomiczne i społeczne a zasady sprawiedliwości dystrybtywnej", *Nierówności Społeczne a Wzrost Gospodarczy* 2004, no. 4.
- Lopatka A., "Poziom i przyczyny różnicowania wynagrodzeń w Polsce", *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu* 2015, no. 401.
- Malikowski M., "Przestrzenne aspekty zróżnicowania społecznego. Główne tezy i problemy badawcze", *Ruch Prawniczy, Ekonomiczny i Socjologiczny* 53, 1991, issue 1.
- Manus T.M., Graham M.D., *Creating a Total Rewards Strategy*, New York 2003.
- Phelps E.S., *Rewarding Work*, Cambridge, MA-London 2007.
- Przekota G., "Ocena poziomu i przyczyn zróżnicowania wynagrodzeń w Polsce", *Roczniki Ekonomiczne Kujawsko-Pomorskiej Szkoły Wyższej w Bydgoszczy* 2016, no. 9.
- Raczkowska M., "Nierówności dochodowe w Polsce w relacji miasto-wieś", *Ekonomika i Organizacja Gospodarki Żywnościowej* 2015, no. 112.
- Radzka B., "Zróżnicowanie wynagrodzeń w perspektywie sprawiedliwości dystrybtywnej", *Zarządzanie Zasobami Ludzkimi* 73, 2010, no. 2.
- Samuelson P.A., Nordhaus W.D., *Ekonomia* 2, Warszawa 2004.
- Sen A.K., *Nierówności: dalsze rozważania*, Kraków 2000.
- Smoder A., Mirosław J., "Luka płacowa (gender pay gap). Pojęcie, metody pomiaru, sposoby ograniczania", *Zarządzanie Zasobami Ludzkimi* 2016, no. 3-4 (110-111).
- Temkin L.S., *Inequality*, New York-Oxford 1993.
- Tomeczek M., "Nierówności ekonomiczne jako kategoria opisowa i normatywna", *Studia Ekonomiczne* 2017, no. 334.
- Ulman P., Wałęga A., "Nierówności dochodowe w Polsce i ich dekompozycja", *Zeszyty Naukowe Polskiego Towarzystwa Ekonomicznego* 2006, no. 4.
- Wojas M., *Wynagrodzenia i inne świadczenia na rzecz pracowników: dokumentacja i ewidencja księgową*, Stowarzyszenie Księgowych w Polsce, Instytut Certyfikacji Zawodowej Księgowych, Warszawa 2011.
- Wójcik-Żołądek M., "Nierówności społeczne w Polsce", *Infos. Zagadnienia społeczno-gospodarcze* 2013, no. 20.