Lodz Economics Working Papers

Minimum Wage Workers in the Private Sector in Poland: Regional Perspective

Aleksandra Majchrowska,
Paweł Strawiński

2/2019

FACULTY OF ECONOMICS AND SOCIOLOGY
University of LODZ

Minimum wage workers in the private sector in Poland: regional perspective

Aleksandra Majchrowska, Institute of Economics, University of Lodz,
e-mail: aleksandra.majchrowska@uni.lodz.pl
Paweł Strawiński, Faculty of Economic Sciences, University of Warsaw,
e-mail: pstrawinski@wne.uw.edu.pl

Abstract

The aim of the paper is to analyse regional diversification of minimum wage workers in the private sector in Poland and identify regions more vulnerable to minimum wage increases. Firstly, we examine the regional differences in the share of minimum wage workers. Secondly, we look at the structure of minimum wage earners. Finally, we use empirical approach analogous to Nestić et al. (2018) to identify low-wage sections and low-wage regions. We use individual data from the Structure of Earnings Survey in Poland. The research period covers 2008-2016.

Six Polish regions are identified as the low-wage ones: five economically underdeveloped provinces of Eastern Poland and one region located centrally. These regions are characterised not only by high percentage of young people working for the minimum wage, but also high share of prime age and elderly minimum wage workers. High share of minimum wage earners is not only among low-qualified workers, but also among those with secondary education. These are employed in labour intensive, low-wage sections of the economy. What is particularly interesting is the fact that the results are fairly stable over time. To the best of our knowledge this is the first study of such kind not only for Poland but also for other countries.

Keywords: minimum wage; minimum wage workers; low-wage sectors; low-wage regions; Poland

JEL codes: R23, J31, J82

Acknowledgements: The project is financed by the National Science Centre, project number: UMO-2017/25/B/HS4/02916.

1. Introduction

Minimum wage has been defined as the minimum amount of remuneration that an employer is required to pay wage earners for the work performed during a given period, which cannot be reduced by collective agreement or an individual contract.[1] The purpose of minimum wage is to protect workers against unduly low pay and to provide minimum living wage to all who are employed. Minimum wage can also be one of the elements of a policy to overcome poverty and reduce inequality. Setting and adjusting this level is one of the most challenging parts of minimum wage policy. If set too low, minimum wage will have little effect in protecting workers and their families against unduly low pay or poverty. If set too high, minimum wage will be poorly complied with and/or have adverse employment effects.[2]

The number of researches on the impact of minimum wage on employment and unemployment is enormous. Despite that, there is no consensus in the literature, majority of the results points to some small and negative impact of minimum wage growth on employment (for revision see Neumark and Wascher, 2007). The findings are also confirmed by a recent World Bank overview (Kuddo et al., 2015). The eventual disemployment effects are found for workers with relatively low professional qualifications and low labour market experience.

However, due to uneven distribution of workers across regions, the impact of minimum wage policy can be regionally diversified. This result may arise especially in countries where minimum wage policy is established at the national level, while there are some significant differences among regions. When regions differ in industry or workforce composition and proportion of low-wage workers it is very likely that also

[1] https://www.ilo.org/global/topics/wages/minimum-wages/definition/lang--en/index.htm

[2] https://www.ilo.org/global/topics/wages/minimum-wages/setting-adjusting/lang--en/index.htm

the effects of minimum wage policy will be regionally diversified. Therefore, it is useful to identify regions that can be more prone to be affected by the policy. Policymakers should then base their decisions about minimum wage changes on the evaluation of effects in those regions in particular. Better understanding of the possible differences of minimum wage policy results across regions will make decision making process more efficient (Nestić et al., 2018). Since the early 1990's several studies confirmed the significance of regional approach while analysing the employment effects of minimum wages (see e.g. Card, 1992; Neumark and Wascher, 1992; Williams, 1993, Thompson, 2009 for US and Garloff, 2016; vom Berge and Frings, 2017 for Germany).

In this paper we took Poland as an example of a country with national minimum wage policy and significant differences across regions. Analysing the issue of minimum wage in Poland is interesting for several reasons. Firstly, due to long history and simplicity of minimum wage policy. National minimum wage in Poland was introduced in 1956. It affects all the workers in all economic sectors and regions. Secondly, because of its coverage. According to the Eurostat data, Poland is the country with one of the highest shares of minimum wage workers among all European economies. In 2014 proportion of employees earning less than 105% of the minimum wage in Poland reached 11.7%.[3] Taking into account that small firms tend to pay lower wages, the number for total employment would definitely be higher.

Thirdly, significant increases in the national minimum wage in Poland occurred in 2008-2009. In those years nominal minimum wage was increased by 20 and 13% y/y respectively. Even in the real terms, the scale of changes was still significant. Fourthly, Poland is country with large regional differences. In 2016 GDP per capita in the most

[3] Full-time employees, 21 years or older, working in enterprises with 10 employees or more, NACE rev. 2 sections B to S excluding section O, apprentices excluded.

developed region reached 160% of national average and below 70% in the less developed region. Unemployment rate in 2016 according to the LFS data varied between 9.6% and 4.8%. Differences in the level of economic development, situation on the labour market and other regional characteristics lead to significant differences in wages across regions. In 2016 the average wage level differed from 122% of a country average in the Mazowieckie (capital) region to 84% in Warminsko-mazurskie (North-Eastern) region. Since minimum wage in Poland is established at the national level the differences in average wages lead to differences in the minimum to average wage ratio across regions.

Lastly, because of the existence of reliable data on the individual level it is possible to analyse the regional differences in the number of minimum wage workers in Poland . We have information on individual wages and characteristics of workers from the Structure of Earnings Survey (SES) in Poland, published biannually by the Central Statistical Office in Poland. It is part of the Eurostat Structure of Earnings Survey, a large enterprise sample survey providing detailed and comparable information on the relationships between the level of remuneration and individual characteristics of employees. Taking into account regional dimension, due to data availability we use 16 NUTS-2 Polish regions.

The aim of the paper is to: (1) analyse differences in the share of workers earning minimum wages across regions, (2) analyse the structure of minimum wage earners across regions, (3) identify regions which may be particularly affected by minimum wage changes (low-wage regions). As we use the NACE classification to identify the low-wage sectors we set the research period to 2008-2016 since earlier data use different NACE classification.

This paper is a part of ongoing research on regional effects of minimum wage policy. We modify the criteria proposed by Nestić et al. (2018) to identify the low-wage economic sections and low-wage regions in Poland and we show that the results are fairly stable over time. To the best of our knowledge this is the first study of that kind not only for Poland but also for other countries. The previous studies concerning Poland (se e.g. Broniatowska et al. (2015) or Majchrowska et al. (2016)) were concentrated on the possible heterogonous impact of minimum wage policy on regional labour markets.

The structure of the paper is as follows. The second part describes minimum wage policy in Poland and changes in minimum wage level which were observed in the last years. The third part describes the data. The fourth part analyses regional distribution of minimum wage workers by age, education, occupational group, size of the employer, and economic sections. The fifth part aims to identify the low-wage section of the national economy and low-wage regions. The sixth part contains conclusions.

2. Minimum wage policy in Poland

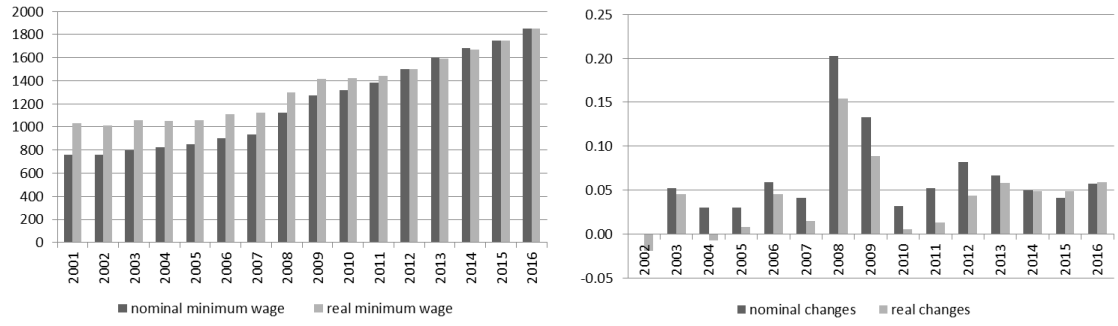
The national minimum wage in Poland is regulated by the law. The level of monthly minimum wage is set up every year by negotiations within the Socio-Economic Council, composed of representatives chosen from the government, employers' organizations, and trade unions. If the Council is unable to reach a consensus, the minimum wage level for the following calendar year is decided solely by the Council of Ministers. The minimum wage in Poland is set up at the national level and covers workers in all sectors, regions, and occupations[4].

[4] Up to 2016 there was a sub-minimum wage for first-entrants during their first year of employment at the level of 80% of statutory minimum wage.

The yearly changes of minimum wage are regulated by law. The annual increase is guaranteed to at least match the amount of price level rise projected for the next year. In addition, in 2005 the Polish government introduced an automatic annual increase in the minimum wage, which reflects two thirds of the forecasted GDP growth rate. This rule is set until the minimum wage reaches half of the average monthly wage in the national economy[5].

The actual yearly growth of the minimum wage has usually exceeded the minimum rate of growth required by the law. In 2001–2016, the minimum wage in Poland increased from 760 to 1850 PLN, that is, by almost 250%. In 2001–2007, the minimum wage increases were relatively modest: the average growth rate in that period was 3.6%. In 2008 and 2009, the national minimum wage in Poland was augmented by 20.3% and 13.3% y/y, respectively, in nominal terms (see Figure 1).

Figure 1. Nominal (PLN) and real (deflated by HICP, constant 2015 prices) minimum wage in Poland in 2001-2016 (left) and changes in nominal and real minimum wage in 2002-2016 (%, y/y)



Source: own calculations based on Eurostat data.

After adjusting by the consumer price index (CPI), the real increase of the minimum wage was still significant: 16.1% and 9.8%, respectively. Changes in the

[5] Minimum Wage Act of October 10th, 2002 with changes.

following years were again modest. In 2010-2016 the average yearly growth rate of minimum wage was 4%.

3. Data

To analyse data concerning minimum wage workers we use data from the Structure of Earnings Survey in Poland (SES). It is part of the Eurostat Structure of Earnings Survey, a large enterprise sample survey providing detailed and comparable information on the relationships between the level of remuneration and individual characteristics of employees (sex, age, occupation, length of work experience, highest educational level attained, etc.) and those of their employer (economic activity, size and location of the enterprise). The database includes both full and part time employees who worked for the whole month of October in the researched years. It is carried out with biennial frequency.

The underlying advantage of the SES data is the high reliability of information on salaries. In other surveys, the salaries are declared by the respondents and, hence, are often downward-biased (Strawiński, 2015). In the SES survey, however, the salaries are reported by the accounting departments. Another advantage of the SES data is the size of the database. The SES survey covers around 13% of the total number of enterprises with more than nine employees. The total number of observations in the sample is around 670,000 in 2008 and almost 800,000 in 2016. Yet, the disadvantage of the database is that it represents only entities employing more than nine employees, but by taking into account the employment structure in Poland and very high share of self-employed individuals without employees (own-account workers), the authors can estimate that the authors' database covers approximately 97% of employed contract workers in Poland. This high share of own-account workers is due to differences in

taxation; they can pay flat taxes and social security contributions, instead of progressive ones (Majchrowska, Strawiński, 2018).

Before we start to analyse the data on minimum wage workers across regions, we define the minimum wage workers. According to the law[6], the remuneration of a worker employed in a full-time job in Poland cannot be lower than the level of minimum wage. However, to calculate the employee's remuneration, some of the wage components and benefits resulting from the employment relationship are taken into account.

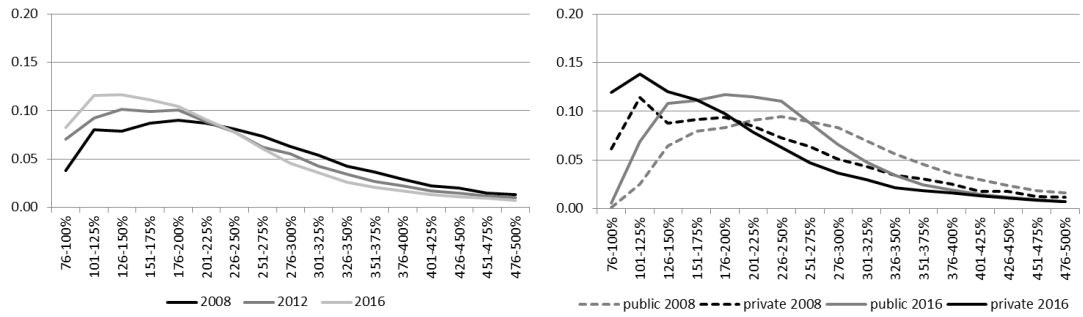
Looking at the data for Poland we can see that there are two types of workers whose monthly wages are related to minimum wage. The first group consists of workers with very low base salary, close to minimum wage, however, their total gross monthly salary is much higher. Most of them are insurance agents and other workers working in occupations were significant part of the total wage is changeable. The second group of workers are those whose total gross monthly salary (with all wage components benefits) is around the minimum wage level. In this paper we would like to concentrate only on very low paid workers, so we analyse only workers belonging to the second group described above. They consist of those workers whose total gross salary at the end of the month is very low – at the minimum wage level or very slightly above. The number of minimum salary earners in Poland is calculated in accordance with the methodology provided by the Eurostat. It is the number of persons for whom the salary level in October each year, when converted to the full month salary, does not exceed 105% of

[6] Minimum Remuneration Act, http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU20022001679/U/D20021679Lj.pdf

the national minimum wage binding in a given year[7]. Our measure of interest is the total gross monthly salary paid by the employers to the workers.

We also had to make some adjustments in the data. Firstly, we excluded all workers working in the public sector. Looking at the data we can notice that only 0.3% in 2008 and 1.2% in 2016 of all workers employed in the public sector received not more than 105% of minimum wage (see Figure 2).

Figure 2. Distribution of employees by wage level (as the multiplicity of minimum wage level in %) in Poland in 2008, 2012, and 2016 (left panel) and in public and private sector in Poland (right panel) for workers employed in firms with at least 10 employees in 2008 and 2016



Source: Own calculations based on Structure of Earnings Survey, CSO, various editions from 2006-2016.

Secondly, the sample was restricted to adult persons aged 18-65 years. The lower bound restriction comes from the definition of working age provided by the Central Statistical Office in Poland[8]. The upper bound restriction comes from the official retirement age. In 2008–2012 it was set at 60 years for women and 65 years for men. In 2013 a phased increase of the retirement age to 67 years by 2020 for men and

[7] https://ec.europa.eu/eurostat/statistics-explained/index.php/Minimum_wage_statistics#Proportion_of_minimum_wage_earners

[8] Age of working ability, i.e. for men group of the age 18-64 years, for women – 18-59 years, source: https://stat.gov.pl/en/metainformations/glossary/terms-used-in-official-statistics/861,term.html

by 2040 for women was introduced. The retirement age was supposed to increase by three months each year. However, in 2017 Poland's statutory pension age has been restored. In the years 2013-2016 some of the 65 years old workers had to stay a few months longer on the labour market, thus we decided to set up the upper age bound in our analysis at the age of 65.

Thirdly, in the analysed period, the minimum wage legislation in Poland covered only workers employed on permanent contracts. Therefore, those who worked on basis other than regular full- or part-time contracts are not considered. Since working part-time is a rare phenomenon in Poland, the authors decided to leave them in the sample after recalculating their part-time salaries into full-time monthly salary equivalents. Fourthly, we eliminated all workers employed in firms with less than 10 employees. The SES sample is drawn a year before the survey and the register information may not be actual, so some employed workers in smaller firms could be surveyed. Such information is not included in the final sample.

And finally, to eliminate possible mistakes in the data, we exclude observations for which the total monthly gross salary at the end of the month was below 51% of minimum wage level binding in a given year. The final sample consists of 316,093 observations in 2006 and 450,363 in 2016.

The analyses in the paper are provided for the regions at the NUTS-2 level of classification. Unfortunately, statistical data on minimum wage earners are not available for regions at the lower territorial level. We take into account all 16 NUTS-2 regions in Poland. The research period covers the years 2008-2016.

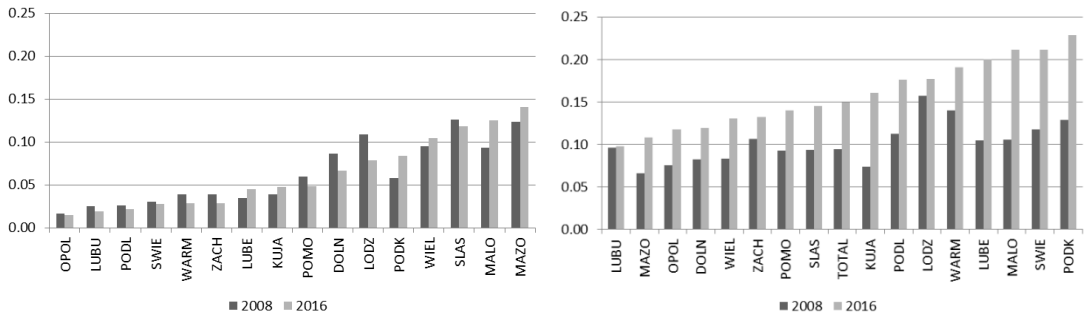
4. Regional distribution of minimum wage workers in Poland

The data shows that in 2016 almost 15% of all workers employed in the private sector in Poland (in firms with at least 10 employees) earned not more than 105% of minimum

wage (see Figure 3). This number has significantly increased during the analysed period – in 2008 the share of minimum wage workers was 9.5%.

Looking at the distribution of minimum wage workers across regions one can notice that it is uneven. The majority of minimum wage workers are employed in the most developed Polish regions (Mazowieckie, Malopolskie, Slaskie, and Wielkopolskie) with big agglomerations (Warsaw, Cracow, Katowice, and Poznan, respectively). In 2016 almost 50% of all minimum wage workers in the private sector were employed in those four regions (see Figure 3). On the other hand, only 8.4% of all minimum wage workers were employed in four regions with the lowest shares. The regions with low share of all minimum wage workers are mostly the relatively low developed ones, located both in the Western and Eastern parts of Poland. The disproportions in the distribution of minimum wage workers have increased in time.

Figure 3. The distribution of minimum wage workers by regions (% of all minimum wage workers in private sector in Poland, left panel) and regional diversity of the share of minimum wage workers in local employment in private sector in 2008 and 2016



Source: Own calculations based on Structure of Earnings Survey, CSO, various editions from 2008-2016.

The distribution of minimum wage workers depends to high extent on the size of the regions, so the more accurate measure is the proportion of minimum wage workers in local (regional) employment.

In 2016 the share of minimum wage workers in employment in the private sector on regional labour markets varied between 9.7% and 22.9% (see Figure 3). The regions with the highest share of minimum wage workers in local employment are the low developed regions of the Eastern Poland (Podkarpackie, Swietokrzyskie, Malopolskie, Lubelskie). In those regions minimum wage workers constituted 20% or more of all private sector employees in 2016. The lowest share of minimum wage workers in regional private employment was noted in the Mazowieckie (capital) region and in the Western regions of Poland (Lubuskie, Opolskie, and Dolnoslaskie) bordering with Germany. In those regions the share of workers receiving not more than 105% of minimum wage in 2016 was around 10-12%.

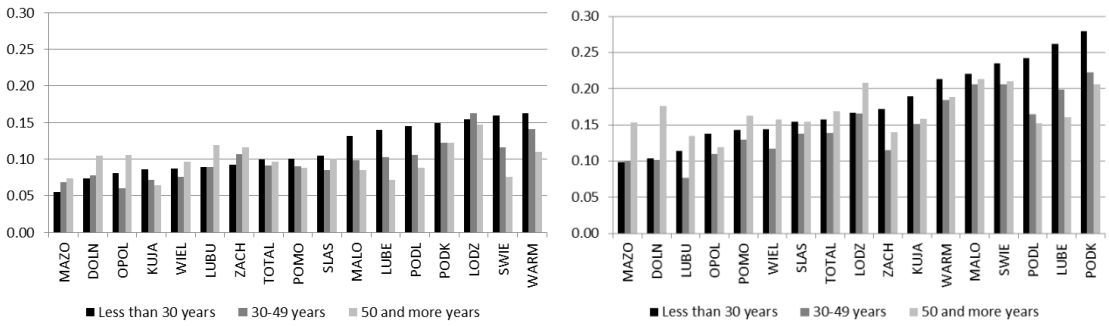
In 2008 the share of employees who earn not more than 105% of minimum wage varied from 6.6% to 15.7%. What is important is the fact that in almost all regions (apart from one – Lubuskie) this share has significantly increased (see Figure 3). In some of the Eastern regions of Poland it has even doubled. In general, looking at the wage distribution in regional labour markets, one can observe that in most of the regions 50% of all employees in the private sector earn not more than 200% of minimum wage in a given year. And one must remember that those numbers concern only workers employed in firms with at least 10 employees. Taking into account that small firms tend to pay lower wages the number of low wage earners in the whole economy would definitely be higher.

5. The structure of minimum wage workers across regions

In the second step we aim to analyse the differences in the structure of minimum wage workers across regions. We analyse the distribution of minimum wage workers by age, educational level, NACE sections and occupational groups.

Seeing how many workers in a given age group receive not more than 105% of minimum wage leads to a conclusion that this share is the highest among young people. In 2016 approximately 16% of all young (18-29 years old) workers in the private sector earned not more than 105% of minimum wage. Moreover, this share is strongly diversified across regions – in the low developed regions of the Eastern Poland more than 24% (and even 28% in Podkarpackie) of young workers received not more than minimum wage (see Figure 4). In the capital region this ratio reached 10%. Comparing to 2008 one can notice that the share of minimum wage workers among not only young but also other age groups has increased significantly, in some regions it has even doubled. The Eastern regions of Poland are also those with high share of minimum wage workers among middle-aged and older workers – in 2016 around 16-22% of both middle-aged and 50 years old and older workers earn not more than the minimum wage.

Figure 4. Share of workers receiving not more than 105% of minimum wage by age groups and regions in Poland in 2008 (left) and 2016 (right)

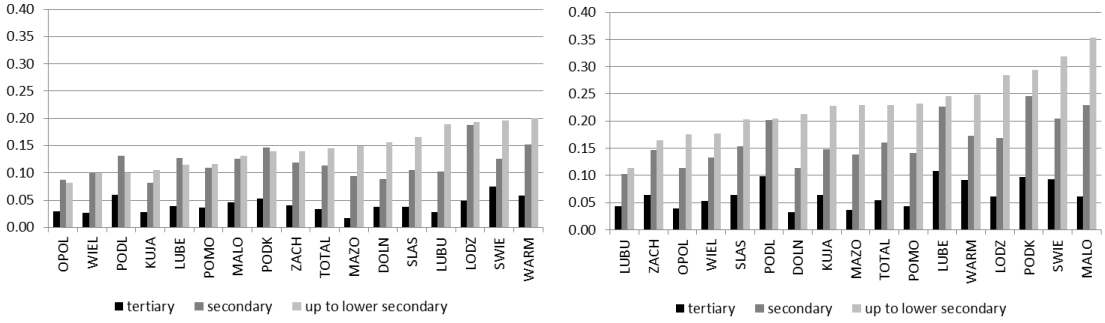


Source: Own calculations based on Structure of Earnings Survey, CSO, various editions from 2008-2016.

The incidence of minimum wage workers was mostly among the less educated workers however the educational structure of minimum wage workers is highly diversified across regions. In the less developed Eastern regions of Poland more than 30% of all low educated workers in the private sector received not more than 105% of

minimum wage. In the Western regions this share was significantly lower, not exceeding 20% (see Figure 5). What is important is the fact that the share of minimum wage workers has significantly increased not only among low-educated workers, but also among those with secondary and tertiary level of education.

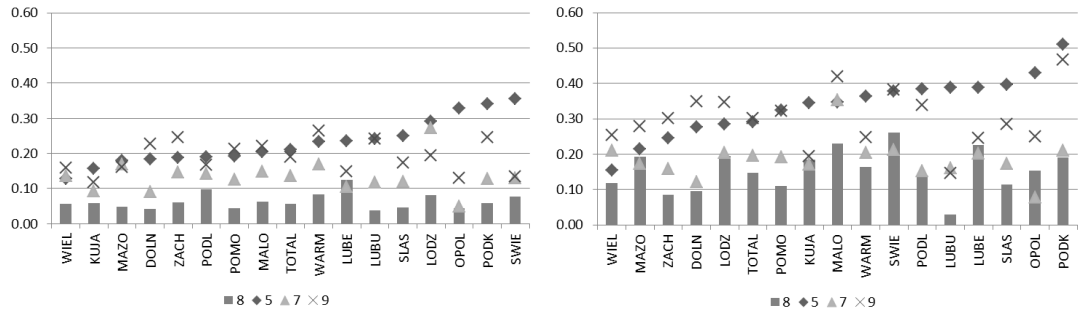
Figure 5. Share of workers receiving not more than 105% of minimum wage by educational level and regions in Poland in 2008 (left) and 2016 (right)



Source: Own calculations based on Structure of Earnings Survey, CSO, various editions from 2006-2016.

Minimum wage workers are strongly diversified by occupational groups. The highest incidence of minimum wage workers was observed among Service and sales workers (5th major occupational group) and Elementary occupations (9th). In both groups the share of minimum wage workers in total employment in a given group was around 20% in 2008 and around 30% in 2016. Relatively high percentage of minimum wage workers was also observed among groups 7th (Craft and related trades workers) and 8th (Plant and machine operators and assemblers). The lowest share of minimum wage workers was noted among Managers (1st major occupational group) and Professionals (2nd).

Figure 6. Share of workers receiving not more than 105% of minimum wage by selected occupational groups and regions in Poland in 2008 (left) and 2016 (right)

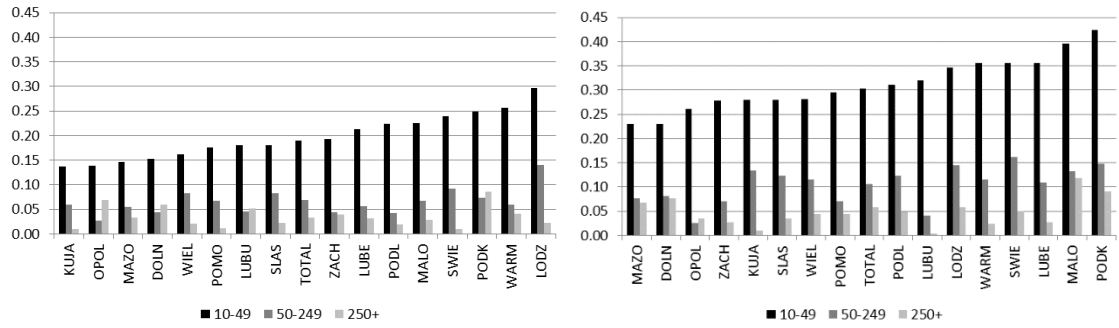


5 - Service and sales workers, 7 - Craft and related trades workers, 8 - Plant and machine operators and assemblers, 9 - Elementary occupations. Source: Own calculations based on Structure of Earnings Survey, CSO, various editions from 2008-2016.

The share of minimum wage workers within particular occupational groups is strongly diversified across regions. In Podkarpackie, one of the low developed Eastern regions, the share of minimum wage workers among Service and sales workers and Elementary occupations was around 50% in 2016 (see Figure 6). In Western regions of Poland and in Mazowieckie (capital) region it did not exceed 30%. In most of the regions and in most of the occupational groups the share of minimum wage workers has increased in the analysed period.

The majority of minimum wage workers is employed in small firms (10-49 employees). In 2016 as much as 63% of all minimum wage workers were working in those firms. In the Eastern part of Poland, the share of minimum wage workers in small firms is the highest: in 2016 even 40% of all workers earned not more than 105% of minimum wage (see Figure 7). We do not have information about employment in micro firms (with less than 10 employees), but in those firms the share of minimum wage workers would probably be even higher. In the analysed period the share of minimum wage workers in small firms has significantly increased in all regions.

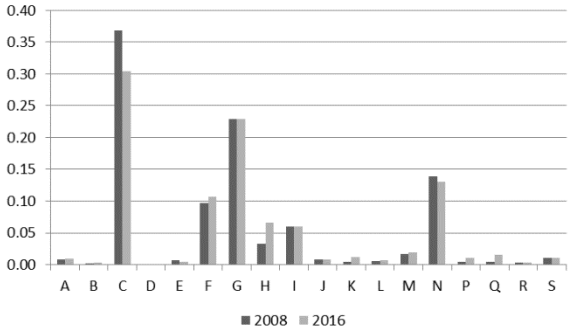
Figure 7. Share of workers receiving not more than 105% of minimum wage by firm size and regions in Poland in 2006 (left) and 2016 (right)



Source: Own calculations based on Structure of Earnings Survey, CSO, various editions from 2008-2016.

Minimum wage workers are employed mostly in manufacturing (NACE section C, see Figure 8) and Wholesale and retail trade; repair of motor vehicles and motorcycles (NACE section G).

Figure 8. Distribution of workers receiving not more than 105% of minimum wage by broad economic sections in Poland in 2008 and 2016.



Source: Own calculations based on Structure of Earnings Survey, CSO, various editions from 2008-2016.

Over 60% of all workers in private sector are employed in those two sections. Additionally, in 2016 53% of all minimum wage workers in the private sector were employed in those two economic sections. More than 10% of minimum wage workers are employed also in Administrative and support service activities (N) and Construction (F).

6. Identification of low wage regions

The third aim of the paper is to identify low wage regions, i.e. regions which can be particularly affected by minimum wage increases. We follow the methodology proposed by Nestić et al. (2018) who identified low- wage sectors and low-wage regions in Croatia. When we applied the original criteria, the results indicated that nearly all Polish regions would be classified as the low-wage ones, hence we modified the procedure to take into account some specific features of Polish labour market.

We start with identification of low-wage sections. We use data on employment across 1-digit NACE sections[9] (19 sections). We propose the three-step procedure: in the first step we look at the importance of particular sections in the economy and at the share of employed in a given section within the total number of employed in Poland. We then eliminate those economic sections with share of employment lower than 2%.

In the second step, we analyse the share of minimum wage workers across economic sections. Since we aim to identify the low-wage sectors, we eliminate those with low percentage of minimum wage workers. Since the share of minimum wage workers has significantly increased in the analysed period (from 9.5% in 2008 to 15% in 2016 on average in Poland), we decide to take the relative measure: we eliminate those economic sections where the share of minimum wage workers was below the half of country average.

And lastly, in the third step, we want to obtain the economic sections where not only the share of minimum wage workers is relatively high, but also significant number of workers earns slightly more than minimum wage. Therefore, we analyse the relation of minimum wage to median wage in each economic section and eliminate those with

[9] Statistical classification of economic activities, see: https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF

relatively high wages. Since the relation of minimum to median wages in all economic sections has significantly increased in the analysed period, again we have to take relative measure. We decided to drop those economic sections were the relation of minimum to median wage was below 80% of this relation at the country level. We tried to construct the criteria in such a way to end up with not more than 5-6 low-wage economic sections (out of 19 analysed sectors at 1-digit level of NACE classification).

Table 1. The criteria for identification of low-wage sectors in Poland in 2008 and 2016

	2008			2016		
NACE section	Employment share	Minimum workers share	Minimum to median wage	Employment share	Minimum workers share	Minimum to median wage
A	0.83	8.86	53.01	0.66	19.95	64.78
B	0.68	2.21	25.03	0.93	5.94	32.24
C	39.59	8.81	46.92	38.57	11.79	54.61
D	0.75	0.00	28.43	1.14	0.24	31.14
E	0.65	9.87	42.09	0.71	9.63	53.83
F	8.69	10.59	41.70	6.44	24.89	61.40
G	22.23	9.73	51.33	21.38	16.02	63.79
H	3.88	7.99	44.79	5.55	17.87	65.60
I	2.10	27.09	72.91	2.30	38.74	84.09
J	3.25	2.34	28.39	3.52	3.53	30.66
K	4.11	1.06	27.97	4.13	4.36	36.77
L	1.65	3.07	42.65	1.36	7.19	52.13
M	3.16	4.99	34.86	3.73	7.64	38.71
N	4.75	27.57	79.68	4.91	39.77	88.18
O	0.02	0.00	27.12	N.A.	N.A.	N.A.
P	1.26	3.78	49.66	1.81	8.59	60.66
Q	1.90	2.01	47.87	2.08	11.56	60.66
R	0.16	17.86	69.54	0.23	18.02	71.43
S	0.32	33.29	80.09	0.54	29.66	64.37
Total	100	9.46	46.50	100.00	14.95	56.33

Employment share – Share of employed in a given section (%, total employment in Poland=100%). Minimum workers share – Share of minimum wage workers in employment in a given section (%, employment in a given section =100%). Minimum to median wage – Relation of minimum wage to median wage in a given sector (%). Low-wage sections identified are marked with grey. Source: Own calculations based on Survey on Earning Survey data from 2008 and 2016. Data on minimum wage level in a given year are taken from Eurostat.

We proceed the analyses for 2008 and 2016. The results for 2008 indicate 6 low-wage sections: C – manufacturing, F – Construction, G - Wholesale and retail trade; repair of motor vehicles and motorcycles, H - Transportation and storage, I - Accommodation and food service activities, and N - Administrative and support service activities (Table 1). In 2016 the results are almost identical with the ones obtained for 2008. The same six sections are identified as the low-wage ones. Additionally, section Q (Human health and social work activities) was also characterized by relatively low wages and high share of minimum wage workers (Table 1) and was also included as the low-wage section.

The results are in line with the authors' intuition. The identified sections are labour intensive ones where rather low skills of employed workers are needed. What is particularly interesting is the fact that when we sum up the percentage of all workers employed in the low-wage sections identified, it occurs that in both years they cover 81% of all workers employed in the private sector in the firms with at least 10 employees. After having identified low-wage sectors, we again follow the methodology of Nestić et al. (2018) and we use low-wage economic sections to identify the low-wage regions. Again, we had to modify the criteria to take into account some specific features of Polish labour market.

As the first criterion we analyse the share of minimum wage workers in total employment in a given region. We take into account those regions where this relation was above the country average[10]. Secondly, we look at those regions were not only the share of minimum wage workers is relatively high but also significant number of workers earns slightly more than minimum wage. In those regions the relation of

[10] Weighted with the share of employment. In the process of identification of low wage regions, we had to analyse relative criteria since the absolute numbers had significantly changed in the analysed period.

minimum to average wage would be relatively high. We take into account those regions where this relation was above the country average. Thirdly, as low-wage regions we treat the regions where relatively high percentage of workers is employed in the low-wage sections identified above. Again, we take those regions where this percentage was above the country average.

Table 2. The criteria for identification of low-wage regions in Poland in 2008 and 2016

	2008			2016		
	Minimum workers share	Minimum to median wage	Low-wage section share	Minimum workers share	Minimum to median wage	Low-wage section share
Dolnoslasie	8.2	47.0	79.7	11.9	52.9	77.3
Kujawsko-pomorskie	7.4	49.4	88.0	16.1	62.9	88.7
Lubelskie	10.5	53.2	79.1	20.0	66.0	82.7
Lubuskie	9.6	50.3	88.5	9.7	49.1	90.7
Lodzkie	15.7	54.0	85.3	17.6	59.6	83.4
Malopolskie	10.6	49.0	82.1	21.1	60.7	76.2
Mazowieckie	6.6	36.3	67.8	10.8	45.9	70.1
Opolskie	7.5	46.8	82.2	11.8	56.5	84.9
Podkarpackie	12.9	56.0	89.1	22.9	67.8	90.9
Podlaskie	11.2	51.6	84.2	17.6	64.0	87.2
Pomorskie	9.3	45.1	85.1	14.0	54.7	80.8
Slaskie	9.3	45.0	80.7	14.5	56.1	81.7
Swietokrzyskie	11.7	49.9	89.5	21.1	65.5	88.7
Warminsko-mazurskie	14.0	53.9	85.5	19.1	65.1	86.0
Wielkopolskie	8.3	46.9	88.6	13.1	57.8	89.0
Zachodnio-pomorskie	10.6	49.5	83.0	13.3	58.7	86.8
Poland	9.5	46.5	81.3	15.0	56.3	81.2

Minimum workers share – Share of minimum wage workers in employment in a given section (%, employment in a given section =100%). Minimum to median wage – Relation of minimum wage to median wage in a given sector (%). Low-wage section share – Share of workers who are employed in the low-wage sections identified in this paper. Low-wage regions identified are marked with grey. Source: Own calculations based on Survey on Earning Survey data from 2008 and 2016. Data on minimum wage level in a given year are taken from Eurostat.

The results (see Table 2) show that in 2008 we can identify seven low-wage regions. Most of them (Malopolskie, Podkarpackie, Podlaskie, Warminsko-Mazurskie) are relatively less developed, rural regions of the Eastern Poland. Two regions (Lubuskie and Zachodniopomorskie) are located in the North-Western Poland and one (Lodzkie) is situated in the center.

The situation has changed only slightly in time. In 2016 we can identify six low-wage regions and most of them are the ones observed also in 2008. In 2016 among the low-wage regions we have all (five) regions from the Eastern Poland (Lubelskie, Podkarpackie, Podlaskie, Swietokrzyskie, and Warminsko-Mazurskie). These are five regions that count among the poorest in the European Union[11]. The sixth is the centrally located Lodzkie region.

7. Conclusions

This study analysed regional differences in distribution of minimum wage workers in Poland. Since only 0.3% of public sector workers in 2008 and 1.2% in 2016 received not more than 105% of the minimum wage, analysis focused on private sector workers. We started from analysing regional variation in share of minimum wage workers. The results indicated strong increase in the number of persons earning not more than 105% of the minimum wage in 2008-2016 period. Moreover, uneven occurrence of minimum wage workers could be observed: The regions with the highest share of minimum wage workers in local employment are the low developed regions of the Eastern Poland (Podkarpackie, Swietokrzyskie, Malopolskie, and Lubelskie). In those regions minimum wage workers constituted 20% or more of all private sector employees in

[11] https://www.polskawschodnia.2007-2013.gov.pl/English/Documents_PORPW/Documents/ENG_Strategia_rozwoju_spoleczno_gospodarczego_Polski_Wschodniej_do_roku_2020_Broszura_informacyjna.pdf

2016. Next, we analysed the structure of minimum wage earners. The analyses showed that they were usually young and low educated, working in small firms as services and sales workers or in elementary occupations.

Finally, we used empirical approach analogous to Nestić (2018) and we defined criteria to identify low-wage sections and then low-wage regions. Low-wage section is an economic section in which: (1) minimum wage workers constitute at least 2% of total number of workers; (2) share of low-wage workers is above the half of the country average and (3) relation of minimum to median wage is above this relation at the country level. The following NACE sections were found to be low-wage sections: manufacturing, construction, wholesale and retail trade; repair of motor vehicles and motorcycles, transportation and storage, accommodation and food service activities and administrative and support services. Additionally, in 2016, human health and social work activities section fulfilled criteria of low-wage section. It is interesting that all, but one low-wage sections are non-tradable sections aimed at meeting the needs of local customers.

We used low-wage sections to identify low-wage regions. We proposed three criteria: (1) share of minimum wage workers in region is above the country average; (2) relation of minimum to median wage is above the country average; (3) share of workers employed in low-wage sections in region is above the country average. Using abovementioned criteria, we identified seven low-wage regions in 2008 and six low-wage regions in Poland in 2016. The results showed that three regions (Lubuskie, Malopolskie, Zachodniopomorskie) identified in 2006 as low-wage ones, in 2016 were no longer in that group. Additionally, in 2016 Lubelskie and Swietokrzyskie regions were found to be low-wage regions.

The low wage regions are generally economically underdeveloped provinces of the Eastern Poland with an exception of centrally located Lodzkie region. These are among the poorest regions in the European Union. These regions are characterised not only by relatively high percentage of young people working for the minimum wage, but also high share of prime age and elderly workers who earn minimum wage. Also, high share of minimum wage earners is not only among low-qualified workers but also among secondary educated ones. In addition, the low median wage level in these regions indicates that many people work for a wage just little above the minimum wage. These are to a large extent employed in labour intensive, low-wage sections of the economy.

The originality of presented results stems from a fact that we showed that both low-wage economic sections and low-wage regions are fairly stable over time. The changes occur in medium or long term. To the best of our knowledge this is the first study of the kind not only for Poland but also for other countries. The conducted analyses showed that a country-wide minimum wage may affect each regional labour market differently, depending on its characteristics. We aim to corroborate this result in future research.

References

Broniatowska P., Majchrowska A., Żółkiewski Z. (2015) Minimum wage and youth unemployment in local labour markets in Poland, Roczniki Kolegium Analiz Ekonomicznych, Vol. 39, p. 57-70.

Card D. (1992), Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage, Industrial and Labor Relations Review, 46(1), p. 22-37.

Garloff A. (2016) Side effects of the new German minimum wage on (un-)employment: First evidence from regional data, IAB Discussion Paper, 31.

Kuddo A., Robalino D., Weber M. (2015) Balancing regulations to promote jobs. From employment contracts to unemployment benefits, World Bank Group.

Majchrowska A., Broniatowska P., Żółkiewski Z. (2016) Minimum Wage in Poland and Youth Employment in Regional Labor Markets, Emerging Markets Finance and Trade, Volume 52, Issue 9, pp. 2178-2194.

Nestić D., Babić Z., Blažević Burić S. (2018) Minimum wage in Croatia: sectoral and regional perspectives, Economic Research-Ekonomska Istraživanja, Vol. 31, Issue 1, pp. 1981-2002.

Neumark D., Wascher W. (1992), Employment effects of minimum and subminimum wages: Panel data on state minimum wage laws, Industrial and Labor Relations Review 46(1), p. 55–81.

Neumark D., Wascher W. L. (2007) Minimum Wages and Employment, Foundations and Trends(R) in Microeconomics, 3(1-2), March, p. 1-182.

Thompson J.P. (2009) Using Local Labor Market Data to Re-Examine the Employment Effects of the Minimum Wage, ILRReview, 62(3), p. 341-366.

vom Berge P., Frings H. (2017) High-impact minimum wages and heterogeneous regions, IZA Discussion Papers, 10782.

Williams N. (1993) Regional effects of the minimum wage on teenage employment, Applied Economics, 25(12), p. 1517-1528.