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Minimum wage and youth unemployment in local labor markets in Poland

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1. Introduction

The aim of the paper is to analyze the impact of minimum wage on youth (less than 25 years old) unemployment in local (NUTS4) labor markets in Poland. In particular the authors aim to answer a question of whether a uniform minimum wage, which is relatively (with respect to local average wages) high in some districts, is a factor negatively affecting youth employment.

The ratio of minimum to average wage in Poland is extremely diverse between regions. In 2013, it varied from 34% in Mazowieckie (capital) region to 49% in Podkarpackie, Lubuskie and Warminsko-mazurskie, all of them less developed regions of Poland. The differences are even more extreme on NUTS4 (districts) level. In 2013 the ratio of minimum to average wage varied from 24% in lubinski district to 65% in kepinski district. Particularly in low wage districts, the single minimum wage may be too high when compared to local productivity, and therefore harmful to employment prospects. The potential adverse effects usually emerge among low-pay segments of the labor market (young people and low-skilled workers). The distribution of these groups of workers is uneven also across NUTS4 districts, what provides an additional argument in favor of including not only regional, but also local dimension into the discussion on minimum wage policy.

To some extent, our paper aims to aims to answer a question of whether the recommendation of OECD should be taken into account in a public debate. In the 2014 edition, OECD experts recommended to the Polish government to "*refrain from increasing the minimum-to-average wage ratio. Consider differentiating the minimum wage across regions depending on local labor market conditions"* (OECD, 2014)[5]. Differentiation of the minimum wage across districts in Poland has been also recommended by the business organizations[6].

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[4] All opinions presented within this paper reflect solely the authors' personal beliefs and shall not be identified with the official standpoint of the institutions' they are employed by.
[5] It has been also recommended to Poland by the OECD in its previous Economic Survey reports (2014, 2012, and 2010). However they did not provide any econometric analyses.
[6] https://www.bcc.org.pl/Artykul.242.0.html?&no_cache=1&tx_ttnews[tt_news]=7204&tx_ttnews[backPid]=3

Our hitherto analysis have shown that in the sample containing all NUTS2 regions in Poland, the parameter by minimum wage variable was not significant. Changes in youth employment were driven mostly by changes in business cycle and in school enrolment ratio. However the impact of minimum wage on employment differed significantly among regions, both in terms of size and sign (Majchrowska et al., 2015). The regions where youth employment rates would be negatively affected by changes in minimum to average wage ratio for the whole period were the rural, less developed regions of Poland (Lubelskie and Podkarpackie). These are regions with average wages much lower than Poland's average, and minimum to average wage ration higher than the rest of Poland.

Thompson (2009) argues that counties may better represent labor markets than states do. This is the case mainly for teen workers, as they not only have limited labor market experience, but face other constraints (such as limited access to transportation or low average earnings) that keep them close to home in looking for work. This seems to be supported also by the fact that the NUTS4 regions in Poland are considered as the local labor markets, having their own Local Labor Offices, responsible for unemployment policy. Following this approach, we check our hypothesis on Polish NUTS4 districts. The analyses in the paper are therefore based on 379 NUTS4 Polish local labor markers. The analyzed period is 2003-2013.

The structure of the paper is as follows. In section two the short review of literature is presented. Section three describes the data. Section four contains empirical strategy and results. Section five concludes.

2. The impact of minimum wage on regional labor markets - review of literature

The data at the regional level have been extensively used in the research on the impact of the minimum wage legislation on the labor market behavior since the early 1990s. Neumark and Wascher (2007a) explain the emergence of this strand of analyses and then its eruption in the years to come by the increasing tendency of the state authorities in the US in the 1990s to formulate their own state-specific minimum wage policies beyond the federal minimum wage regulations.

The rationale behind the increasing trend of the autonomous[7] state minimum wage policies was an observation that the minimum wage fixed at the uniform federal level may affect local labor markets in various ways. It might be potentially detrimental to employment in the low-wage states while no such effect would be envisaged for the high-wage areas.

This question could not be addressed by the previous minimum wage research that focused on the time-series national-level data. The new minimum wage research, including the data at regional level, evolved in two directions: "panel studies" that used region-specific data over time and "case studies" that examined the impact of minimum wage changes in individual regions[8]. The first approach, later dubbed as "the standard

[7] This has been autonomous to some extent since state-specific minimum wage could not be less than its federal level.

[8] See Neumark and Wascher (2007b) for the critical review of both approaches.

panel data approach", rather consistently corroborated previous, based on the time-series research, consensus view that minimum wage increases exert negative impact on employment with the elasticity ranging from -0.15 to -0.20. The "case study" approach originated from the criticism of the panel method, and in particular whether the standard fixed–effect formulation of the panel model handles properly the heterogeneity among the regional units like US states[9]. According to the proponents of the "case study" approach, fixed-effects panel models do no treat appropriately this issue and therefore are prone to produce biased estimates (Kuehn, 2014). To control properly inter-regional heterogeneities the "case study" approach aims at designing a quasi-experiment during which the region affected by the minimum wage change ("the treatment group") is directly compared to the region similar as much as possible except for the minimum wage policy shock ("'a comparison group"). Most of the empirical works applying this approach proves no negative impact of the minimum wage increases on employment or unemployment that is in rather sharp contrast to the panel data approach producing rather systematically adverse effect of minimum wage on the labor market.

This controversy over the treatment of the imminent heterogeneities among the regions was probably one of the reasons why regional minimum wage research started to take into consideration the legislatures smaller than the regions or states, like the county, for which it is potentially easier to find comparable entities. The often cited paper representing this approach is Dube et al. (2010) where the authors compare all county-pairs in the United States that have common state borders and are assumed to be economically homogenous except for having different minimum wage policies. Given this setup, the authors conclude that no adverse employment effects of the minimum wage increases was found. Additionally, the authors apply the traditional panel approach to all-counties sample, using stated fixed effects to control for the counties idiosyncratic differences. By using this method, negative impact of the employment known from the panel data studies is reproduced, and this is interpreted as the result of the downward bias because of not properly controlled spatial heterogeneity. The other works in this spirit with similar conclusions are, among others, Addison et al. (2012) and Allegretto et al. (2013).

While this is the result typical for the "case study" approach, some papers belonging to this strand of research report traditional disemployment effects of the minimum wage increases. For instance, Thompson (2009) analyses the reaction of the employment of young adult workforce at US local labor markets, following 1996 and 1997 sizable rises of the federal minimum wage. After having assumed that the proper level of spatial disaggregation is a county the author divides all the counties into two groups: high-impact and low–impact group. The first group consists of the counties with the relatively low average salaries of the young workers and the low–impact counties are those with relative higher salaries. The author then assumes that it is in the first group of counties where the increasing minimum wage may become binding to employment. He employs difference-in-difference regression technique to model reaction of employment to minimum wage increases in high-impact vis-à-vis low–impact counties. His results

[9] This strand of research started with the seminal work of the Card and Krueger (1994), then followed by other works of these authors, and in the 2000s Dube with coauthors (eg. Dube, Lester, and Reich, 2010) continued vigorously the research in this spirit (see Kuehn, 2014).

confirm relatively strong and statistically significant negative impact of minimum wage on young workers employment. However, this result did not hold anymore when the author repeated this analysis for the states which – as the author argues – are rather heterogenous with respect to the exposure to minimum wage shock. Thompson (2009) concludes his study by pointing out that averaging the effects of minimum wage on employment across all the regions, dominant in the panel data literature, is likely to produce insignificant elasticities and no minimum age effect even if significant disemployment effects at the local labor markets may take place. Examples of other "case study" papers that find disemployment effects of minimum wage are Singell and Terborg (2007), Burke et al. (2010) and Sabia, Burkhauser and Hansen (2012).

Concluding this short review of the regional minimum wage studies at fairly disaggregated level, let us emphasize that while they tend to deny traditionally established result of adverse impact of the minimum wage on employment or unemployment, there are also works confirming the earlier literature consensus. It is also worth mentioning that county-level data (and similar) may be applied both under the "case study" methodological framework and also as panel data approach. This second approach will be applied in this paper and to the best of the authors' knowledge it is the first analysis of the impact of the minimum wage on the local labor market in Poland.

To the best of the authors' knowledge, there have been only five papers that have analyzed the impact of minimum wage on regional labor markets in Poland. Melnyk (1996) analyzed the impact of minimum wage on employment and unemployment rates in Poland with regional (49 NUTS3 regions) data for 1991-1995. He conducted separate regressions for each region, and found that the elasticities of employment with respect to the relative minimum wage varied from -0.26 to -1.23, with the 39 out of 49 estimates being significant. Ciżkowicz et al. (2012), basing their study on 16 NUTS2 Polish regions during 1998-2008, found that minimum to average wage ratio had no impact on employment growth. In Majchrowska and Żółkiewski (2012), a panel approach was applied to data from 1999-2010 data that covered 16 NUTS2 Polish regions. An adverse effect of minimum wage on employment was found, especially in the case of young workers during a period of substantial increase of the minimum wage (2005-2010). Broniatowska et al. (2013) carefully analyzed the situation on both regional (NUTS2) and local (NUTS4) labor markets in Poland, and concluded that the current trend of a rising minimum wage relative to average pay, if continued, may create barriers to low paid jobs, especially in poorer regions.

As local data are concerned, only Ciżkowicz et al. (2014) examined the determinants of unemployment rates in 379 local (NUTS4) Polish labor markets for 2000-2010. They found no impact of minimum to average wages on local unemployment rates. In this paper we continue this approach looking however more carefully on the impact of minimum wage on youth unemployment in local labor markets.

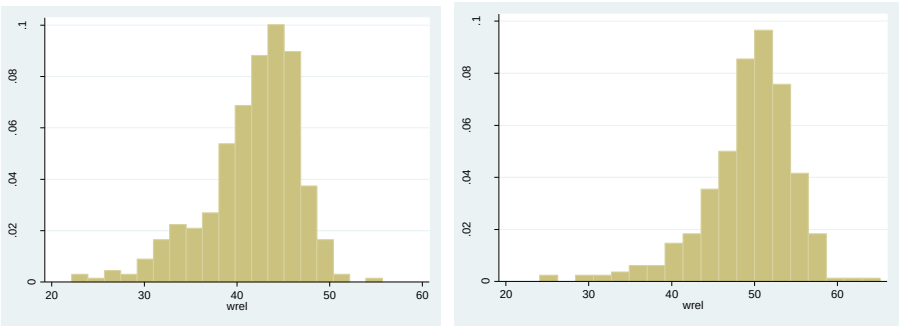
3. Data

We have analyzed data about 379 local (NUTS4) labor markets in the period from 2003[10] to 2013. Since both the data on youth employment and unemployment rates are not available on NUTS4 level, as the dependent variable we use two variables: (1) the number of unemployed below 25 years old to total number of unemployed on local labor markets and (2) the number of unemployed below 25 years old to the population of 20-24 years old[11].

Share of youths in unemployment was in 2013 on average 19% in Poland. It is very diversified across local labor markets. In 2013 the ratio varied from 7% (in the urban district of Sopot) to 37% (proszowicki district in southern Poland). Share of youths in unemployment is among the lowest in well developed, urban areas, whereas it is considerably higher in rural areas. The same concerns the share of youth unemployment in youth population. Although in 2013 it was on average 15% in Poland, its rates varied from 3% (again, in the urban district of Sopot) to 36% (in opatowski district, eastern Poland). Not surprisingly, the differences in youth unemployment between local labor markets (NUTS4) are much higher than the differences between regions (NUTS2).

Our main independent variable is the minimum to average[12] wage ratio on local labor markets. On average in Poland in 2013 it amounted to 41%. The ratio however is extremely diversified among local labor markets and in 2013 varied from 24% to 65%. What is more interesting, in 2013 in 215 (out of 379) local labor markets the ratio of minimum to average wage ratio was 50% or more (see Figure 1). Most of them are rural areas. In these local labor markets the minimum wage, set uniformly at the national level, may be too high comparing to local market conditions and limit the employment perspectives.

Figure 1. The distribution of minimum to average wage ratio across local (NUTS4) labor markets in Poland in 2003 (left) and 2013 (right panel)

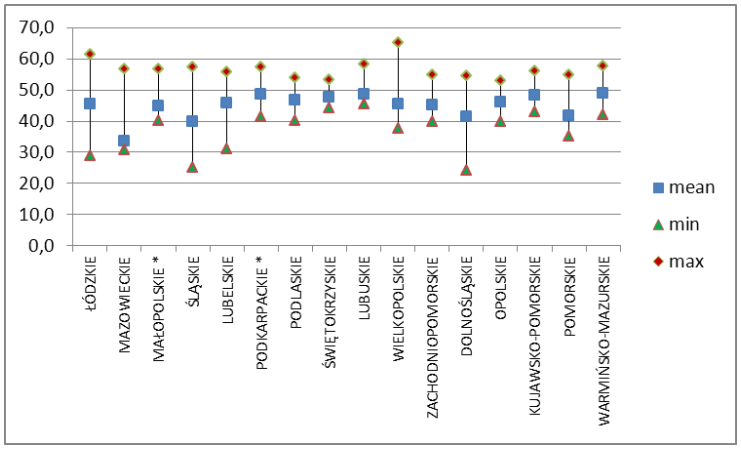


Source: Local Data Bank, CSO, own elaboration.

[10] Earlier data in case of some variables are not available.
[11] To be able to register as an unemployed one has to be at least 18 years old therefore we do not take into account the 15-24 age group.
[12] Average wage in enterprises excluding economic entities employing up to 9 persons.

What additionally supports our analyses at the local labor markets level (NUTS4) is very high diversification of minimum to average wage ratio inside regions (NUTS2). In Mazowieckie (capital) region the minimum to average wage ratio varied in 2013 from 31% to 57%. In Lodzkie region – from 29% to 61% (see figure 2).

Figure 2. Minimum to average wage ratio across and inside NUTS2 regions



Source: Local Data Bank, CSO, own elaborations.

Among other factors which could impact the youth unemployment we control for demand and supply factors. As the demand side is concerned instead of GDP growth[13] we took the growth rate of investments outlays in enterprises and the growth rate of gross value of fixed assets in enterprises. Following Ciżkowicz at al. (2014) we used also the ratio of investment to existing capital stock[14].

On the supply side, the variables which are usually used in minimum wage research are a school enrolment variable and the demographic variables. Data on school enrolment on tertiary or upper-secondary level at NUTS4 level are not available. Therefore we decided to use data on school enrolment at the lower-secondary level. To control for demographic effects we use the share of youths (20-24) in total population. Moreover, following Ciżkowicz et al. (2014), we control for differences in production and employment structure using share of employed in services sector.

4. Empirical strategy and the results

We aim to estimate the parameters of the following equation:

$$u25_{it} = \alpha_0 + \beta_1 wrel_{it} + \beta_2 demand_{it} + \beta_3 school_{it} + \beta_4 pop_{it} + \beta_5 serv_{it} + \zeta_{it} \qquad (1)$$

where:

[13] Which is usually used usually as a proxy for aggregate demand but is not available on NUTS4 level in Poland.

[14] We are aware of imperfections of these measures in controlling for business cycle but there are the only variables available on NUTS4 level.

$u25_{it}$ – share of youths (below 25 years old) in unemployment (or in youth population) in local labor market *i* (*i*=1, 2,…, 379) at time *t* (*t*=2003, 2004, 2013);

$wrel_{it}$ – minimum to average wage ratio in local labor market *i* at time *t*;

$demand_{it}$ – a proxy for business cycle in local labor market *i* at time *t*;

$school_{it}$ – school enrolment ratio on lower-secondary level in local labor market *i* at time *t*;

pop_{it} – share of 20-24 years old in total population in local labor market *i* at time *t*.

$serv_{it}$ – share of employed in services in total employment in local labor market *i* at time *t*.

All the variables enter the equation in logarithms.

In the first step we checked the stationarity of the variables using Harris-Tzavalis unit root test[15]. The results of the unit root test[16] indicate that both dependent variables are stationary. Most of the independent variables are also stationary or trend-stationary so following the approach of Ciżkowicz et al. (2014) we decided to estimate the parameters of the model on levels.

In a second step we estimate the parameters of the model (1) for the whole sample of 379 local labor markets. If our main hypothesis is true, hence in some of the regions minimum wage is binding, and in some of them it isn't, the parameter by minimum to average wage ratio should be small and insignificant as suggested and confirmed for US counties by Thompson (2009).

We start the econometric analyses with pooled estimator (OLS), then we allow the intercept to vary for each district and apply the fixed-effects (FE) and random effects (RE) estimators. However if error terms are correlated across regions the above estimators may be biased (Ciżkowicz et al, 2014). Therefore we perform first panel corrected standard error (PCSE) estimator and finally we apply the generalized least squares estimator allowing for both heteroskedastic error structure and panel-specific AR(1) autocorrelation within panels.

The results (see Table 1) based on the whole sample of the local labor markets indicate that the parameter by minimum to average wage variable is positive and significant. That means that minimum to average wage ratio on local labor markets significantly impacts the share of youths in unemployment. The higher is the minimum wage

[15] This test seems to be the most appropriate among the ones available in a standard software since it does not require both N and T tending to infinity. The Harris-Tzavalis test assumes that the number of time periods, T, is fixed, so it is most appropriate in micropanel studies (www.stata.com). In our case N=379 is much bigger than T=11which to some point justify the choice.

[16] The results of the unit root tests are not presented in the paper due to limited space. They are available upon request.

relatively to average wage in district, the higher share of youths in total unemployment on local labor market[17].

All of the control variables are significant. The business cycle variable[18] is significant and negative which confirms that during economic downturns the young workers are disproportionably affected and the share of youths in unemployment increases. In districts with higher share of employment in services sectors the share of youths in unemployment is lower. The higher share of youths in population and the higher is the school enrolment ratio – the higher share of youths in unemployment.

Table 1. Estimated parameters of the equation (1) for the whole sample – dependent variable – share of youths in total unemployment

	OLS	FE	RE	PCSE	GLS
	Dependent variable – share of youths in unemployment				
wrel	0.267***	0.190***	0.298***	0.402**	0.369***
demand	-0.047***	-0.062***	-0.061***	-0.035***	-0.035***
school	0.365***	0.249***	0.245***	0.376***	0.474***
pop	0.735***	0.635***	0.677***	0.616**	0.500***
serv	-0.454***	-0.050*	-0.343***	-0.394***	-0.400***
R^2	0.554	0.273	0.548	0.981	
F test / Hausman test		16.22 (0.000)	159.30 (0.000)		
N	379	379	379	379	379
T	11	11	11	11	11
No. of obs.	4169	4169	4169	4169	4169

Source: own estimates.

To check the robustness of the results we perform the analyses for other, older groups of workers (25-34 and 35-44 years old). If our hypothesis is true, in these groups the parameter by minimum wage variable should be low and/or insignificant, indicating that minimum wage increases affects only the least experienced, young workers. To check

[17] Similar results were obtained with the share of unemployed youths in population of young as the dependent variable. The results are not presented due to limited space but are available upon request.

[18] We estimated the model (1) with each of the approximation of business cycle variables (the growth rate of investments outlays in enterprises, the growth rate of gross value of fixed assets in enterprises and the ratio of investment to existing capital stock. The last one performed the best in the model.

the robustness of the results, we perform both panel corrected standard errors (PCSE) and generalized least squares (GLS) estimators.

The results of PCSE estimator for 25-34 years old (see Table 2) indicate that the parameter by minimum to average wage ratio is statistically insignificant. The GLS estimates indicate that the parameter is significant but is very low (0.03). Both results show that the level of minimum to average wage ratio in local labor markets in Poland does not have impact on 25-34 years old workers.

In case of 35-44 years old workers the PCSE estimates show that the parameter is statistically insignificant. According to GLS estimates it is significant but small and negative (-0.08). It indicates that the higher are costs of employing young workers (measured by minimum wage) the higher is the demand for more experienced, older workers.

For both groups of workers the parameter by the business cycle variable is statistically significant but the value of the parameter is much lower than in case of young workers. It confirms that youth employment is more sensitive to changes in aggregate demand than the employment of more experienced workers.

Table 2. Estimated parameters of the equation (1) for the whole sample – dependent variable – share of 25-34 and 35-44 years old in unemployment

	25-34		35-44	
	PCSE	GLS	PCSE	GLS
wrel	0.047	0.032***	-0.070	-0.076***
demand	-0.006***	-0.004***	-0.011*	-0.009***
school	0.135***	0.144***	-	-
pop	-0.160***	-0.155***	-	0.041**
serv	-0.048***	-0.054***	0.070***	0.081***
R^2	0.998		0.991	
N	379	379	379	379
T	11	11	11	11
No. of obs.	4169	4169	4169	4169

Source: own estimates.

5. Conclusions

The aim of the paper was to answer a question of whether a uniform minimum wage, which is relatively high with respect to local average wages in some districts in Poland, is a factor negatively affecting youth employment. The analyses were performed on local (NUTS4) data. The analyzed period was 2003-2013.

The results of the empirical analyses presented in the paper show that minimum wage in Poland significantly affects youth unemployment in local (NUTS4) labor markets in Poland. The higher is the minimum to average wage ratio on local labor market, the higher is the share of youth unemployed in total unemployment. The fact that youths are the group which is disproportionally affected by minimum wage increases is confirmed by low and/or insignificant value of the parameter by minimum to average wage ratio for other, older groups of workers.

The results confirm the earlier research on regional (NUTS2) data (Majchrowska et al., 2015). They are also in line with the conclusions of Ciżkowicz et al. (2014). According to the latter paper the minimum to average wage ratio has no impact on overall unemployment rates in local labor markets in Poland. Our analyses confirm that it affects only some of the workers – the least experienced ones. In terms of policy recommendation, this analysis supports the views of OECD experts, who advocate the adjustment of minimum wage to local labor market conditions, rather than further increasing minimum wage relative to average wages in Poland.

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Summary: The aim of the paper is to analyze the impact of minimum wage on youth unemployment (less than 25 years old) in local (NUTS4) labor markets in Poland. The results show that minimum wage in Poland significantly affects youth unemployment in local labor markets in Poland. The higher is the minimum to average wage ratio on local labor market, the higher is the share of youth unemployed in total unemployment. The fact that youths are the group which is disproportionally affected by minimum wage increases is confirmed by low and/or insignificant value of the parameter by minimum to average wage ratio for other, older groups of workers.

Keywords: minimum wage, youth unemployment, local labor markets in Poland.