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MINIMUM WAGE IN POLAND:
ECONOMY-WIDE OR REGIONALLY DIFFERENTIATED?

INTRODUCTION

Minimum wage in Poland, set uniformly across all the regions, has increased substantially over last years and especially after Poland's accession to EU in[1] 2004. There are plans, especially of trade unions, to increase it further to 50% of average wage, following recommendations of the International Labour Organisation[2] (ILO).

This tendency reflects to a large extent EU social and employment policy priorities, with minimum wage envisaged to serve three objectives (European Foundation 2007):

- reducing poverty and wage inequality,

- protection of vulnerable workers,

- encouraging labour market integration ('making work pay').

While labour organizations and social partners tend to highlight social security and protection impact of minimum wage legislation, economists are quite often skeptical whether this is adequate and effective tool of alleviating poverty and income inequalities. They rather emphasise potential danger of setting minimum wage at the level above the productivity of some groups of workers what has adverse effect on the demand for these employees. Moreover, while this objection gives an argument for the certain restraint in augmenting minimum wage, even its modest rise may be harmful to employment if there is

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[1] As of 2010, minimum wage is by almost 60% higher than in 2004. During the same period, average salary increased by approximately 40%. As a result, minimum to average wage ratio has increased during this time from 36% to 42%.

[2] After: Kłos B., *Płaca minimalna w państwach członkowskich Unii Europejskiej (Minimum Wage in the Member States of European Union),* Kancelaria Sejmu, Biuro Studiów i Ekspertyz (in Polish), 2005.

considerable regional variation in average wage and therefore minimum wage may be binding in some low wage regions. Adjustment of minimum wage to local labour market conditions through its regional differentiation is therefore a way to neutralize to some extent negative effects of minimum wage legislation. Poland is a country with considerable regional wage inequalities[3] and also with substantial diversification of unemployment rates across regions and employees groups (especially, with respect to skill, education etc). These characteristics of labour market provide rationale for considering setting of minimum wage at regional basis. This opinion was put forward in this year[4] OECD Economic Survey of Poland 2010 as the following policy recommendation: '*The minimum wage should not be increased relative to the average wage but be differentiated across regions, based on local labour market conditions.*'[5]. This recommendation looks plausible against the background of the stylized facts on the labour market in Poland mentioned above. However, OECD documents do not refer to any up-to-date analysis of the impact of minimum wage on labour market performance in Poland, especially in regional dimension. Indeed, literature on this issue for Poland is not very extensive, leaving the question of assessment of minimum wage policy in fact unfounded on empirical verification.

The main motivation of this study *is to verify the hypothesis that minimum wage may have negative impact on employment in Poland, at least for some workers groups and regions*. Plan of the paper is as follows. In section 2 theoretical considerations on the potential impact of minimum wage on labour market performance will be presented and most important papers on Poland and countries of the region will be quoted. Section 3 will be devoted to discussion of some regional labour market statistics in Poland, important from the point of view of potential impact of minimum wage. In section 4 econometric models will be defined, data used described and results discussed. Section 5 will complete the paper with conclusions.

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[3] In 2008, the average wage in the low end of wage distribution (Warmińsko-mazurskie voivodship) was not more than 2/3 of the wage in the most affluent Mazowieckie voivodship (NUTS-2). More on regional wage and income inequalities in Poland in: Rogut and Tokarski (2005), Wyszyński 2008.

[4] Questions of policies with respect to minimum wage in Poland were raised by OECD in previous Surveys, eg. in 2004 and 2006.

[5] OECD (2010), Economic Survey of Poland 2010, Paris.

IMPACT OF MINIMUM WAGE ON LABOUR MARKET:
THEORY AND EMPIRICAL RESULTS

There is no clear-cut answer on the impact of the increase of minimum wage on labour market performance, except for the stylized, textbook-type neoclassical model with homogenous labour and symmetrical information. In this case, rise in the minimum wage above the competitive equilibrium level, produces decline in demand for labour and increase in the supply, thus leading to the rising (involuntary) unemployment. However, in more 'realistic' neoclassical model with heterogenous labour and products, the result (sign of employment adjustment) depends on the elasticities of substitution across different types of workers and cross-elasticities of demand across different types of goods[6]. When the models are further complicated and more labour market imperfections are being introduced, the results of minimum wage legislation are *ex ante* ambiguous, both theoretically and empirically. For instance, in the model with monopsony in factor markets, rise in the minimum wage has generally non-monotonic impact on employment. It may lead to increase in employment if the new minimum wage is lower than competitive level (adjustment along the supply curve) but it may reduce employment if government sets minimum wage at higher than competitive equilibrium level[7] (adjustment along the demand curve). Also in the labour market model with search frictions, an impact of minimum wage increase is in general indeterminate. I may lead to higher employment if market is dominated by employers (the market wage is low). But if market wages are higher, this will reduce firms' incentives to create jobs, number of vacancies will shrink what will discourage workers from searching for the job and finally employment will be reduced[8]. Also efficiency wage theory gives an argument that rising minimum wage above competitive equilibrium level does not necessarily creates barrier to employment. According to this approach, higher wages generate to workers incentives to increase their productivity (eg., wages determine productivity) what finally results in increased and not decreased employment as potential reaction to minimum wage rise[9].

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[6] D. Neumark, W. Wascher, *Minimum Wages and Employment,* IZA Discussion Paper No. 2570, Bonn 2007.

[7] G. Rocheteau, M. Tasci, *The Minimum Wage and the Labor Market,* Federal Reserve Bank of Cleveland, 2007.

[8] Rocheteau and Tasci – op. cit.

[9] Manning A. (1995), How Do We Know that Real Wages Are too High?, The Quarterly Journal of Economics, Vol. 110, No. 4 (Nov., 1995), pp. 1111-1125

The main body of both theoretical and empirical literature focuses on impact of minimum wage legislation on employment. General specification of the model applied for this purpose may be formulated as follows[10]:

$$ER = f(MW, X) + e \qquad (1)$$

where:

E   – Remployment variable,

MW – minimum wage variable,

X   – vector of control variables (economic activity, labour supply, institutional variables etc.),

E   – unobserved error term.

Usually both employment and minimum wage are expressed in relative terms, eg. as employment-population ratio and minimum-to-average wage[11] ratio, respectively. As for the control variables, some measure of a business cycle position (eg., GDP, output gap etc.) is used to take into account demand factors behind employment fluctuations. Supply factors like some demographic variable (eg. working age population or specific age group, like youths, developments) and institutional variables are also taken as explanatory variables. The latter represent the features of the labour market that may potentially affect sensitivity of employees and employers to minimum wage legislation, like the unemployment benefit replacement rate or union density.

In the earlier research on minimum wage effect, equation (1) was being estimated econometrically as time-series model. Subsequent work along this line brought an understanding that basic model should be modified to take into account residual autocorrelation (eg., inclusion of interactions between the seasonal dummies and a trend and also modelling the error as a first-order autoregressive or AR(1) process[12]). Since 1990's combined time series and cross section data analyses became more and more popular together with the progress in panel data econometrics techniques. Panel data models proved to be particularly useful in the analyses of impact of minimum wage legislation across regions. However, the key problem with this type of models is whether the results based on panel data models (pooled regional time series) are robust to relaxation of assumptions underlying the use of the panel-data methodology, especially on the stability of the regression coefficients both over time and

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[10] Eg., C. Brown, C. Gilroy, A. Kohen, *The Effect of the Minimum Wage on Employment and Unemployment,* Journal of Economic Literature, 20, 1982, pp. 487-528.

[11] Quite often relative minimum wage is measured by the so called Kaitz index that is defined as the ratio of the minimum to the average wage multiplied by the percent of persons covered by the minimum wage (eg, see Neumark and Wascher – *op. cit.*).

[12] See: W. Lee, S. Suardi, *Minimum Wages and Employment:Reconsidering the Use of a Time-Series Approach as an Evaluation Tool,* IZA DP No. 4748, February 2010.

across regions. For instance, McDonald and Myatt[13] have shown that these assumption are problematic for the large part of the panel econometrics literature on minimum wage for Canada and therefore the validity of the negative employment effect of minimum wages, claimed unanimously by this literature, may be questioned.

As for the other potential effects of minimum wage[14], impact on labour force participation is ambiguous. The net effect will result from the interplay of the two countervailing forces: employees withdrawing from the labour market as a reaction to falling employment because of minimum wage rise ('discouraged worker' effect) and workers entering labour market in hope for better paid job ("added worker" effect). As for the impact on unemployment, it will again be interplay of "discouraged" *versus* "added" worker effect, with empirical literature pointing to expected smaller rise in unemployment vis-à-vis drop in employment[15]. Minimum wage legislation may have also impact on employment of other workers, and especially those just above the minimum wage (so called 'spillover effect'). This effect will mean *increase* of the demand for workers just above the minimum if they are substitutes of the employees earning minimum wage and *decrease* if they are complements of workers at minimum wage. Similar mechanism may be expected for the workers earning just below the minimum wage. The 'spillover' (or 'ripple') effect may be also defined and observed with respect to wages. Minimum wage legislation will modify not only wage of the group of workers directly affected but the final effect may materialize throughout the wage distribution as firms try to restore at least some of their former wage structure. Impact of the minimum wage has been also studied in the context of training and human capital formation[16]. As in case of other labour market variables, overall effect is ambiguous. Training effort may be *reduced* if workers are to pay for it but may be *augmented* if higher minimum wage encourages employees to acquire additional training to improve their productivity. Also impact of the minimum wage on school enrollment results

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[13] J. T. McDonald, A. E. Myatt, *The Minimum Wage Effect on Youth Employment in Canada: Testing the Robustness of Cross-Province Panel Studies, mimeo,* Department of Economics, University of New Brunswick, 2004.

[14] EG., see review publications: M. Gunderson, Miminum *Wages In Canada: Theory, Evidence And Policy,* Human Resources and Skills Development Canada 2005; Neumark and Wascher (2007) – *op. cit.*

[15] Gunderson – *op. cit.*

[16] Eg., see: R. P. Cubitt, S. P. Hargreaves-Heap, *Minimum Wage Legislation, Investment and Human Capital,* cottish Journal of Political Economy, 1999, 46(2):135–157; D. Acemoglu, J. S. Pischke, *The Structure of Wages and Investment in General Training,* NBER Working Paper Series, no. 6357, 1998.

from interplay of counteracting forces[17]. On the one hand, potential workers may stay in school longer when jobs are decreasing but on the other hand, they may leave school earlier since opportunity cost of education (the forgone income from a higher wage job) increased. Many researchers have made an effort to verify positive impact of the minimum wage legislation on wage inequality, usually anticipated when introducing this type of regulation[18]. Theoretical considerations lead to presumption that impact of minimum wage on wage inequality is in general ambiguous. Reduction of inequality, desired by the supporters of minimum wage legislation, may result from the fact that some low-wage (minimum wage) jobs will disappear with rising minimum wage, certain low-wage earners may improve their productivity, and also positive spillover effects (on wages near minimum) may materialize. But there will be also countervailing forces, leading to the increase of inequality (especially in the long run) if minimum wage rise discourage training and other human capital formation. Summarizing empirical literature on this issue, mostly on Canada and USA, Gunderson[19] concludes that while minimum wages seem to reduce wage inequality, their positive effect on poverty is problematic, given adverse employment effects of the minimum wage legislation (pp. 30-31).

General conclusions from the large body of empirical studies (mostly on US and Canada) may be formulated as follows[20]:

- for mostly examined employment effect of minimum age, the majority of the literature find adverse impact of the minimum wage legislation. Eg., according to the Neumark and Wascher[21], two thirds of 102 studies surveyed resulted in negative employment effects, and only 8 positive,
- if significant impact of minimum age on employment was found, then respective elasticities were dispersed along wide range of estimates,
- adverse labour market effects of minimum wage legislation concentrate in particular segments, mostly low-skilled young workers,

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[17] Eg., D. Neumark, W. Wascher, *Minimum Wage Effects on Employment and School Enrollment,* Journal of Business and Economic Statistics 13 (1995) pp.199-206; Gunderson 2005 – *op. cit.*

[18] Eg., see: D. Card, J. DiNardo, *Skill-Biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles,* Journal of Labor Economics 20, 2000, p. 733-783; S. Bazen, *The Impact of the Regulation of Low Wages on Inequality and Labour-Market Adjustment: A Comparative Analysis,* Oxford Review of Economic Policy, Vol. 16, No. 1 (Spring 2000), pp. 57-69; T. Lemieux, *Increased Residual Wage Inequality: Composition Effects,* Noisy Data or Rising Demand for Skill, University of British Columbia 2005, Department of Economics Working Paper.

[19] Gunderson – *op. cit.*

[20] See: Neumark, Wascher – *op. cit.;* Gunderson – *op. cit.*

[21] Neumark Wascher – *op. cit.*

−results are less clear for other potential effects of minimum wage legislation, eg. labour force participation, training and education, wage inequality etc.

Similarly to the diversity of the results for the main world economies, most of the scarce literature on the countries of Central and Eastern Europe reveals negative impact of minimum wage legislation on employment but the results are not unanimous. For instance, for the Czech republic Fialova and Mysikova[22] find significant adverse consequences of the minimum wage for labor market (unemployment rate) while Gottvald et al.[23] and Eriksson and Pytlikova[24] claim that impact of minimum wage on employment is unclear, and effect on wages turned out to be positive. For Hungary, Halpern et al.[25] report sizeable adverse impact of minimum wage increase on employment and Kertesi and Köllő [26] confirm these results in case of employment opportunities in the small enterprise sector.

Research for Poland on labour market consequences of minimum wage legislation has not produced, as for other countries, commonly accepted conclusions. Melnyk[27] found strong negative impact of minimum wage rise on employment and unemployment rates. He also identified a large degree of regional disparity with respect to employment elasticity of minimum wage. Conclusions of the study of Suchecki[28] were as follows: there is strong adverse employment and unemployment effect of minimum wage increase especially for

[22] K. Fialova, M. Mysikova, *Minimum Wage: Labour Market Consequences in the Czech Republic,* IES Working Paper: 6/2009, Charles University in Prague, 2009.

[23] J. Gottvald, J. Hančlová, M. Pytlikova, *Minimum Wage and Its Impact on Wage Distribution, Unemployment and Hours Worked,* In: Gottvald J. et al. (Eds), *Determinants of individual pay and firms pay structures in the Czech and Slovak Republics 2002,* Ostrava, VŠB-TU.

[24] T. Eriksson, M. Pytlikova, *Firm-level Consequences of Large Minimum-wage Increases in the Czech and Slovak Republics 2004,* Labour, 18(1), p. 75-103.

[25] L. Halpern, M. Koren, G. Kőrösi, J. Vincze J., *A minimálbér költségvetési hatásai [Budgetary effects of the rise in the minimum wage],* Közgazdasági Szemle, Series 51, April 2004, pp. 325-345, as discussed in: D. Benedyk, M. Rigó, Á. Scharle, P. Szabó, *Increases in The Minimum Wage in Hungary, 2001–06,* Ministry of Finance Working Paper No. 16, January 2006.

[26] G. Kertesi, J. Köllő, *A 2001.évi minimálbér-emelés foglalkoztatási következményei [Employment effects of the 2001 rise in the minimum wage],* Közgazdasági Szemle, Series 51, April 2004, pp. 293-324, as discussed in: D. Benedyk, M. Rigó, Á. Scharle, P. Szabó, *Increases in The Minimum Wage in Hungary, 2001–06,* Ministry of Finance Working Paper No. 16, January 2006.

[27] A. M. Melnyk, *The Minimum Wage and Unemployment in Poland: Lessons for Cuba's Transition,* Cuba in Transition, ASCE 1996.

[28] B. Suchecki*, Narzędzia kształtowania dochodu godziwego w Polsce (Policies of decent income in Poland),* in: S. Borkowska (ed.), *Wynagrodzenia godziwe. Koncepcja i pomiar,* IPISS, Warszawa 1999 (in Polish).

young workers (15-24 years), and much weaker for other groups. Ruzik[29] found that minimum wage might constraint employment of unskilled workers. Boni[30] (ed.) claimed that it is not only level of minimum wage that matters but also alternative sources of income in case of employees and non-wage labour cost for employers (especially for low educated and young workers). The most extensive study on impact of minimum wage on labour market by Jacukowicz[31], based on survey of firms (ended with the conclusion that there was no impact of minimum wage on unemployment and no need of regional differentiation of minimum wage. Also Golnau[32] concluded his study with the general supposition that minimum wage has rather insignificant impact on employment and unemployment. If the adverse effects of raising minimum wage emerge, they are restricted to low-wage workers (eg. youths) and these effects are rather small.

STYLIZED FACTS ON REGIONAL PICTURE
OF LABOUR MARKET IN POLAND

MINIMUM WAGE IN POLAND

Minimum monthly wage in Poland is negotiated on an annual basis within the Tripartite Commission for Social and Economic Affairs, composed of representatives of government, employees' and employers'. Then upon the results of the negotiations, government sets the minimum as legally binding for all the wage contracts in the subsequent year. If there is no consensus within the Tripartite Commission, the minimum wage is set unilaterally by the government. Minimum wage legislation provides exceptional treatment for the first-time entrants to the labour market. For this group, wages may be set at 80% of the statutory minimum wage in the first year of their employment and at 90% in the second. As of 2007, approximately 4% of Polish employees received the minimum remuneration.

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[29] A. Ruzik, *Minimalne wynagrodzenie – analiza wpływu na zatrudnienie w Polsce, (Minimum wage – an analysis of impact on employment in Poland),* Instytut Pracy i Spraw Socjalnych, Polityka Społeczna nr 1/2007, Warszawa (in Polish).

[30] M. Boni M (ed.), *Elastyczny rynek pracy w Polsce. Jak sprostać temu wyzwaniu?(Elastic labour market in Poland. How to meet this Challenge?,* Zeszyty BRE Bank – CASE Nr. 73, 2004.

[31] Z. Jacukowicz, *Analiza minimalnego wynagrodzenia za pracę (Analysis of minimum remuneration for work),* IPiSS, Warszawa 2007, seria "Studia i Monografie" (in Polish).

[32] W. Golnau, *Znaczenie płacy minimalnej dla funkcjonowania rynku pracy (The impact of the minimum wage on the labour market in Poland),* Wydawnictwo Uniwersytetu Gdańskiego, 2007, (in Polish).

DISTRIBUTION OF MINIMUM WAGE RECIPIENTS

Looking at the distribution of minimum wage recipients in Poland we may notice that it concerns mostly young people (below 25 years old, see Figure 1). About 35% of employed in the age group 15-17 in 2004 received minimum wage.
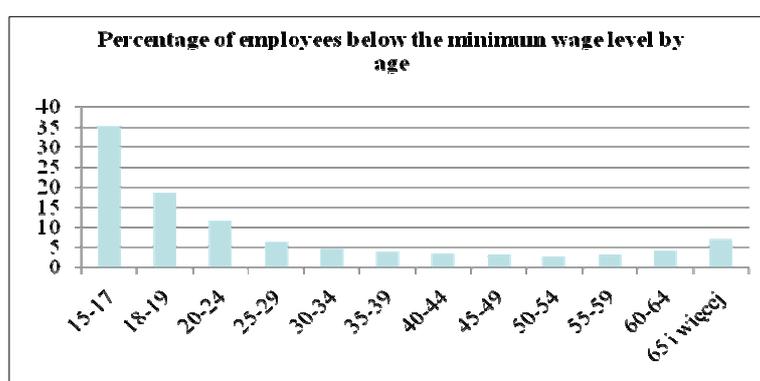

Figure 1. Minimum wage employees by age (%, 2004)

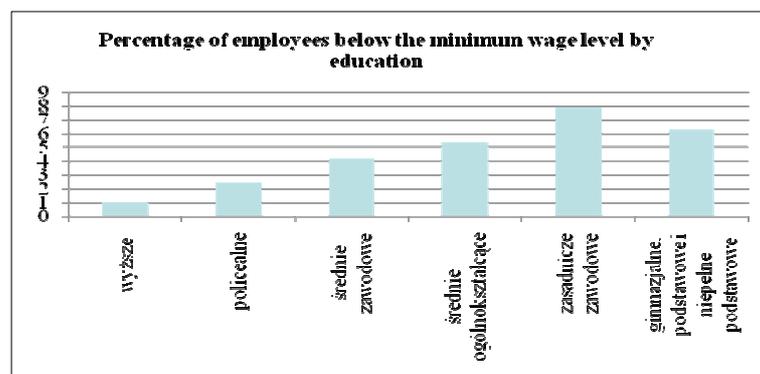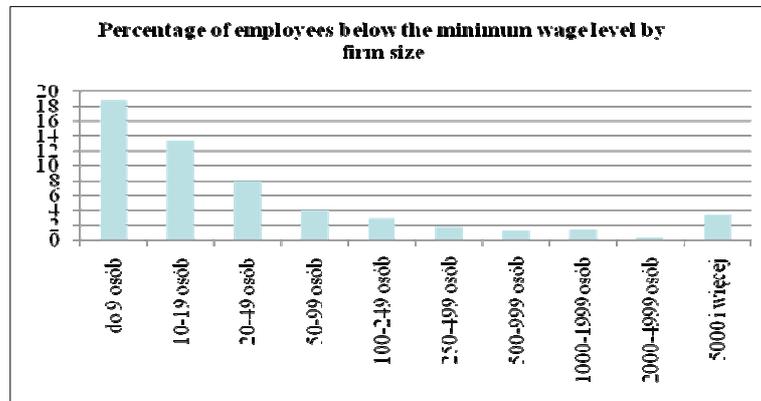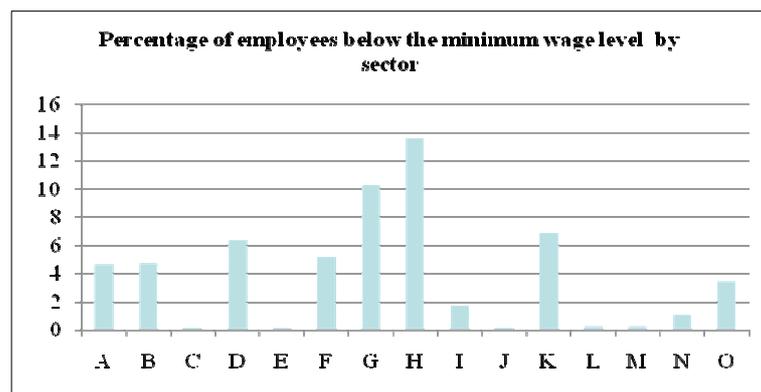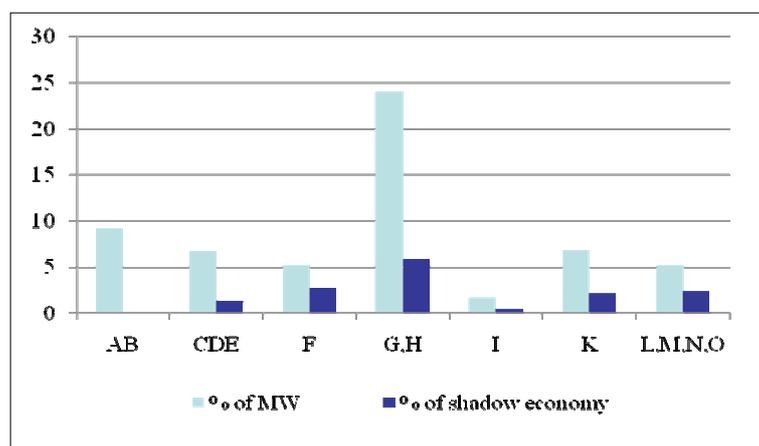Source: Jacukowicz, *Analiza minimalnego wynagrodzenia za pracę... – op. cit.*

Figure 2 Minimum wage employees by education (%, 2004)

Source: Jacukowicz, *Analiza minimalnego wynagrodzenia za pracę... – op. cit.*

Figure 3. Minimum wage employees by firm size (%, 2004)

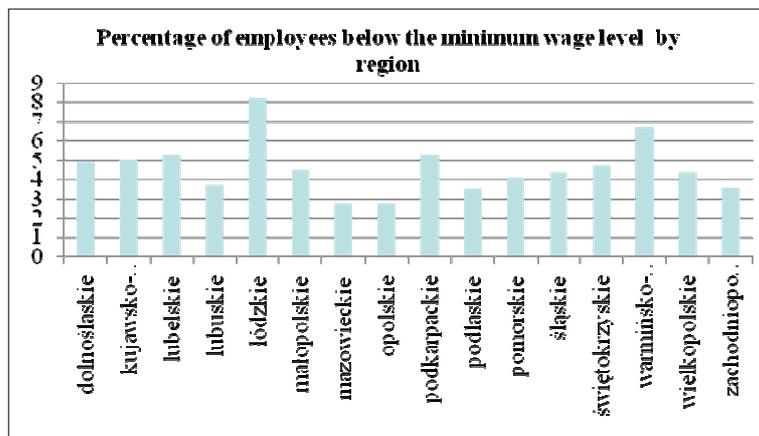Source: Jacukowicz, *Analiza minimalnego wynagrodzenia za pracę... – op. cit.*

Figure 4 Minimum wage employees by sector (%, 2004)

Source: Jacukowicz, *Analiza minimalnego wynagrodzenia za pracę... – op. cit.*

As for the education level, minimum wage earners are mostly the least skilled workers with vocational training ('zasadnicze zawodowe') of whom 7,9% receive minimum wage and those with at most basic education ('podstawowe i niepełne podstawowe') of whom 6,3% are affected by minimum wage (see Figure 2). Moreover, looking at the distribution of minimum wage by firm class, we may notice that minimum wage recipients are employed mostly in small enterprises (below 9 or between 10 and 19 employees, see Figure 3). The firms paying minimum wages are mostly located in services (see Figure 4), especially in trade (sector G) and hotels and restaurants (sector H). What is worth emphasizing, these are the sectors in which there is the highest percentage of

production in the shadow economy (see Figure 5). This is apparently factor that may complicate accurate measurement of minimum wage employment coverage and also may put bias on estimated effect of minimum wage legislation.

Figure 5. Shadow economy by sector (%, 2004)

Source: Jacukowicz, *Analiza minimalnego wynagrodzenia za pracę... – op. cit.*

**Figure 6. Minimum wage employees by region (%, 2004)**

Source: Jacukowicz, *Analiza minimalnego wynagrodzenia za pracę... – op. cit.*

Minimum wage recipients are also not evenly distributed among regions. The highest share of them are employed in lodzkie and warminsko-mazurskie

regions (see Figure 6). The lowest share of minimum wages workers were noticed in mazowieckie and opolskie regions.

CHANGES OF MINIMUM WAGE IN POLAND

Looking at the changes of minimum wage in Poland during the last ten years we may notice significant changes. The level of minimum wage increased from 650 PLN in 1999 to 1276 PLN in 2009, ie. almost doubled (see Figure 7).
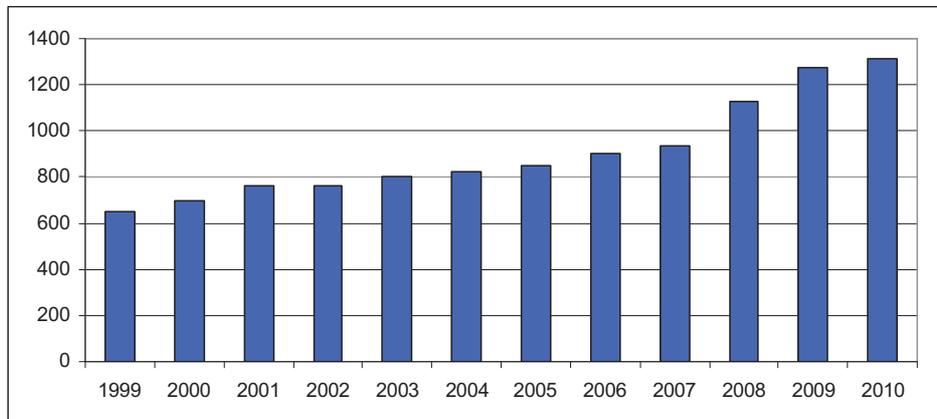
Figure 7. Minimum wage in Poland, 1999–2010 (PLN)

Source: Ministry of Labour and Social Policy (www.mpips.gov.pl).

The minimum wage changes were not uniform over time. The most significant rises were concentrated at the beginning of the analyzed period (about 8% per year in 2000–2001) and then in 2008 and 2009 (respectively about 20.3% and 13.3% per year) – see Figure 8.
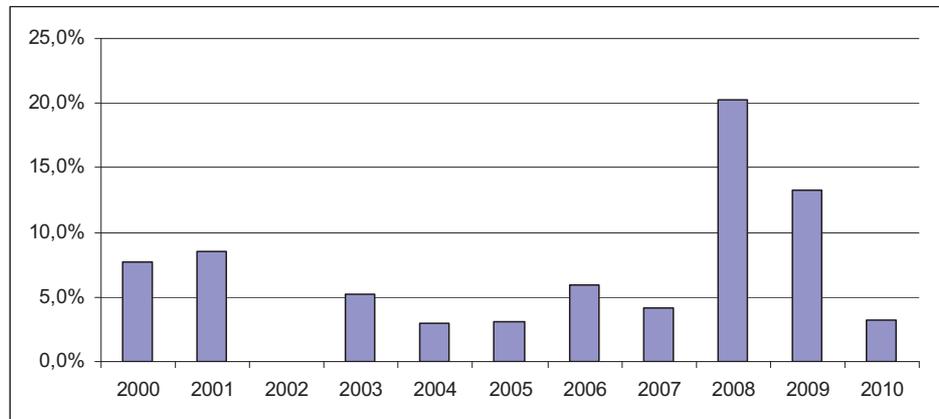
Figure 8. Minimum wage in Poland, 1999–2010 (yoy, %)

Source: Ministry of Labour and Social Policy (www.mpips.gov.pl).

Wage developments in Poland during analysed period and in particular rises in the minimum wage resulted in the changes of its ratio with respect to the average wage in Poland (see Figure 9).
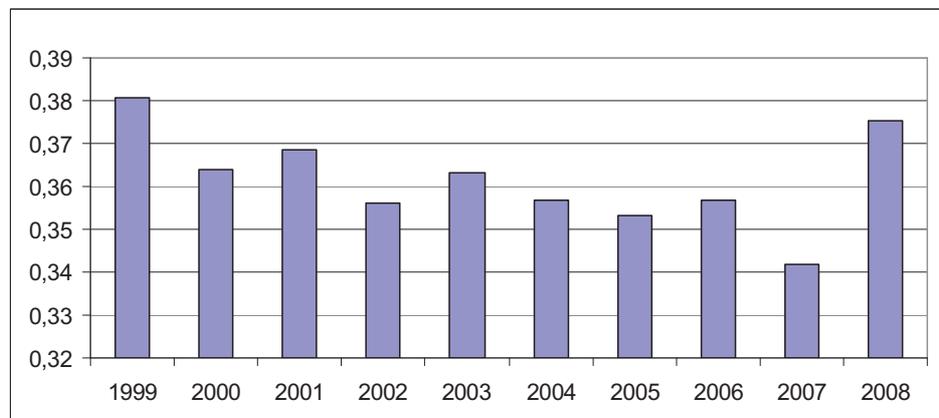
Figure 9. Minimum to average wage ratio in Poland, in 2002–2008 (%)

Source: www.stat.gov.pl, own calculations.

In 1999 the minimum to average wage ratio in Poland was about 38%. In subsequent years this ratio fluctuated to have decreased to 33% in 2007. The

strong increase in minimum wage in Poland in 2008 has led to increase in minimum to average ratio to 38% and 41% in 2009 (own estimates based on the official data).

REGIONAL DIVERSITY OF WAGES IN POLAND

Looking at the regional distribution of wages among regions we can see significant differences. These differences result to a great extent from variation in regional structure of production (eg., see Rogut and Tokarski[33]). The highest wages are observed in the financial sector and in some industries (mostly mining).

The highest wages in Poland are observed for mazowieckie (capital) region (128-129% of average wage in Poland in 2002–2008) where financial services are concentrated. Wages above the average are observed also in slaskie (103% in 2002–2008), the region with considerable share of mining industry. Relatively high wages (around average) are noted in dolnoslaskie (mining industry) and pomorskie (shipyard industry).

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[33] A. Rogut, T. Tokarski, *Determinanty regionalnego zróżnicowania płac w Polsce (Determinants of regional wage differentiation in Poland),* Ekonomista, nr 1, 2005, s. 75 (in Polish).
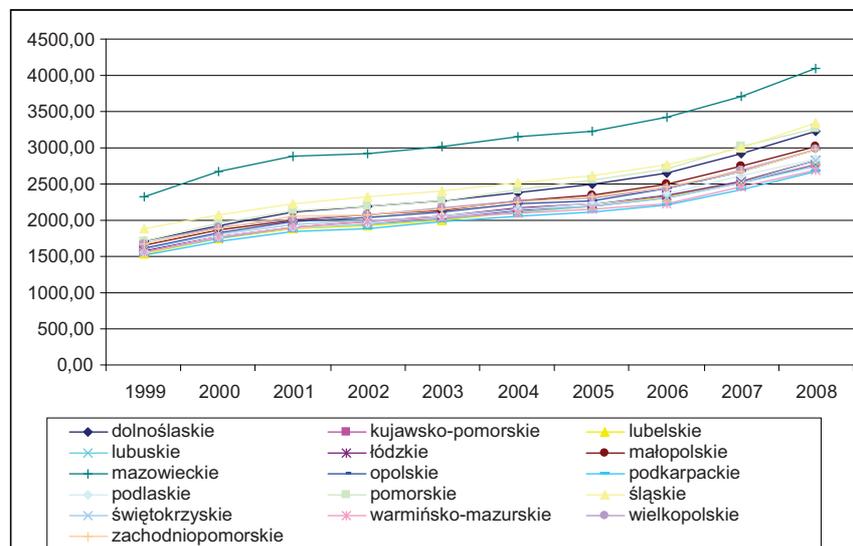
**Figure 10. Average monthly gross wage by voivodship, 1999–2008 (PLN)**

Source: www.stat.gov.pl.

The lowest wages in Poland are observed in rural regions of the eastern part of Poland (podkarpackie with 83-84% of average wage in Poland) and also in western regions of Poland with high structural unemployment (warminsko-mazurskie, lubuskie, kujawsko-pomorskie, 83-86% of average wage in Poland).

Looking at the regional diversity of wages in Poland (the average level of coefficient of variation in the analysed period around 0.12) we may however notice that it's scale is very much affected by very high wages in mazowieckie. Without mazowieckie in the sample the value of coefficient of variation decreases significantly (to 0.6-0,7). The second observation is that regional diversity of wages in Poland has been persistent during the analysed period.

REGIONAL DIVERSITY OF MINIMUM TO AVERAGE RATIO

The uniform economy-wide minimum wage in Poland on the one hand and considerable regional diversity of average wage by regions result in the significant variation of regional minimum to average wage ratio (see Figure 11).
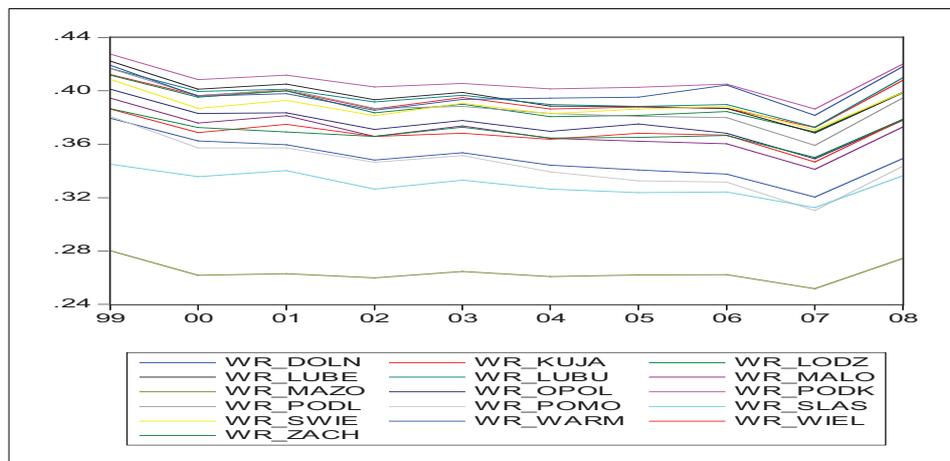
Figure 11. Minimum to average wage ratio by voivodship, 1999–2008 (%)

Source: www.stat.gov.pl and www.mpips.gov.pl, own calculations.

For instance, if we analyse the data for 2008, then with the average ratio of 38%, regional statistics varied considerably. In the most affluent mazowieckie voivodship minimum wage was less than 27% of average wage in this region, while in poor podkarpackie and warminsko-mazurskie voivodships this ratio was about 42%. The differentiation of comparable size was persistent during the analysed period (see Figure 11). In particular, we may notice the following stable in time groupings of regions:

‒ Mazowieckie – the lowest relation of minimum to average wage (0.25-0.28),

‒ Slaskie, Pomorskie, Dolnoslaskie – relatively low (0.32-0.36),

‒ Podkarpackie – the highest ratio (0.39-0.43).

According to other studies[34], regional variation in wages may be to a large extent explained by the differences in labour productivity across the regions and

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[34] eg., see Rogut, Tokarski – *op. cit.*

territorial inequalities of wages and incomes are even more sharp at more disaggregated level, like powiat[35] (county). Namely, regions (voivodships) with low average wage levels are at the same time characterised by low productivity. And especially in those regions minimum wage, high with respect to the regional average, might be the factor limiting demand for labour since cost of employing low productive worker would in some cases outweigh the product of his work.

MODEL AND THE RESULTS

MODEL

Trying to analyze the impact of minimum wage level on employment in Poland on the regional level we estimate the parameters the following equation, which follows general specification used predominantly in the literature (see section 2 above):

$$Empl_{it} = \alpha_0 + \alpha_1 w\min_{it} + \alpha_2 X_{it} + \xi_{it} \tag{2}$$

where:

$Empl_{it}$ – employment rate on regional labour market i in Poland at time t,

$w\min_{it}$ – minimum to average wage ratio on regional labour market i in Poland at time t,

X_{it} – vector of control variables (proxy for production, school enrolment, employment structure, institutional variables),

ξ_{it} – error term.

Trying to analyse the impact of minimum wages on employment rate we have to remember that the regional differences in the latter are due to many other factors (among others, the level of economic activity, the school enrolment ratio, the production structure (especially in Polish case the share of labour in agriculture sector)) as well as the institutional variables which may have impact on the level of regional employment, like unemployment benefit to average wage ratio.

Mostly because of the problems with long individual time-series data for the regions, we had to use the panel analyses option. All panel data series are stationary. Due to availability of the statistical data we used annual data.

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[35] See also: R. Wyszyński, *Regionalne dysproporcje dochodowe w Polsce (Regional income inequalities in Poland)* [w:] *Wzrost gospodarczy a bezrobocie i nierówności w podziale dochodu,* Pacho W., Garbicz M. (red.), SGH, Warszawa 2008 (in Polish).

As the aim of the paper is to assess the impact of minimum wages on employment on regional labour markets, especially among the most vulnerable groups, our dependent variables are: employment rate in the age group 15-64, employment rate among young (age 15-24) and employment rate among low skilled, as measured by lower than the secondary education level.

The explanatory variables vector includes: minimum to average wage ratio, different measures of economic activity, enrolment ratio among 20-24 years old and the share of labour in agriculture sector.

ESTIMATION RESULTS

Results for the employment rate of the most general population of employees (age group 15-64) as dependent variable do not confirm the hypothesis that minimum wage limited overall employment in Poland in the analysed period. The elasticity of employment rate with respect to minimum to average wage ratio is very low (0,006-0,04) and not significant (see Table 1).

These results indicate that employment rate in Poland is lower in regions with higher school enrolment (SE), and moreover that the employment rate in Poland seems to be negatively and significantly correlated with the unemployment benefit ratio (ZAS).

Table 1

Estimation results for the dependent variable: employment rate 15-64

Employment rate 15-64					
Wr	**0.043**	**0.038**	**0.014**	**0.006**	**0.006**
PKB					
spbm	0.019				
Nio		0.022			
Nisp			0.004		
Sdto				-0.002	
Sdnz					0.000111
SE	-0.217***	-0.223***	-0.218***	-0.217***	-0.218***
LR	-0.016	-0.017	-0.016	-0.016	-0.0159
ZAS	-0.643***	-0.647***	-0.658***	-0.661***	-0.660***
CSFE	Yes	Yes	Yes	Yes	Yes
TFE	No	No	No	No	No
Skor.R2	0.887	0.886	0.885	0.885	0.885

However, if we take the results of next series of estimations in which impact of minimum wage on employment of potentially vulnerable group of young workers is investigated (15-24 age group), we can confirm a significant and negative sign of parameter for employment rate with respect to minimum wage (see Table 2).

Table 2

Estimation results for the dependent variable: employment rate 15-24

Employment rate 15-24					
Wr	**-0.416**	**-0.311**	**-0.413**	**-0.522***	**-0.529***
PKB					
spbm	0.0591				
Nio		0.149*			
Nisp			0.062		
Sdto				0.083	
Sdnz					0.047
SE	-0.791***	-0.830	-0.798***	-0.815***	-0.810***
LR	0.00457	0.000370	0.007	0.006	0.006
ZAS	-1.762***	-1.722***	-1.778***	-1.802***	-1.808***
CSFE	Yes	Yes	Yes	Yes	Yes
TFE	No	No	No	No	No
Skor.R2	0.756	0.759	0.755	0.754	0.754

Elasticity of employment rate with respect to minimum to average ratio estimated for this model is consistent with the literature and close to the high end of the range[36]. This result mean that 10 percent increase in the minimum wage potentially reduces employment of this group of workers by around five percent.

Additionally, the results indicate that employment rate among young is, as might be expected, negatively and in significant way correlated with enrolment ratio as well as the ratio of unemployment benefit to average wage.

As for the results for another vulnerable group: the least skilled workers, we can not confirm the hypothesis that minimum wage limited employment among

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[36] As earlier literature consensus was -0.1 to -0.3 range (see Neumar, Wascher – *op. cit.*), later research based on more sophisticated methods and more recent data found larger adverse employment effects of minimum wage, belonging to the range from -0.3 to -0.6 (eg., M. Campolieti, T. Fang, M. Gunderson, Minimum Wage Impacts on Youth Employment Transitions, 1993–1999, Canadian Journal of Economics. Vol. 38, No. 1 (February), pp. 81-104.).

this group in Poland. The value of elasticity is positive and not (or very low) significant (see Table 3).

Table 3

**Estimation results for the dependent variable: employment rate
of the least skilled employees**

Employment rate of the least skilled					
Wr	**0.280***	**0.262**	**0.256**	**0.256***	**0.259***
PKB					
spbm	0.011				
Nio		0.00289			
Nisp			0.000127		
Sdto				-0.0321	
Sdnz					-0.0172
SE	-0.358***	-0.360***	-0.359***	-0.353	-0.355***
LR	0.070*	0.070*	0.070*	0.070*	0.070*
ZAS	-0.725***	-0.733***	-0.736***	-0.740***	-0.737***
CSFE	Yes	Yes	Yes	Yes	Yes
TFE	No	No	No	No	No
Skor.R2	0.819	0.818	0.819	0.819	0.819

When interpreting this result one should remember that it may be distorted by the relatively large 'shadow economy' in Poland[37] that covers mostly low-skilled segment of the labour market. As emphasized before, shadow economy is concentrated in trade, and hotels and restaurants sections when the education level of employees is relatively low and salaries are also less than economy-wide average[38]. These facts are also confirmed by the results of the comprehensive study[39] on shadow economy in Poland according to which most of the shadow economy employees are the least-skilled blue collar workers. As a consequence, we are not able to measure correctly neither their employment nor wages in this case. And more important, the mechanism of adjustment of employment to the

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[37] 'Shadow economy' is officially estimated at ca. 15% in 2007 (GUS 2009).

[38] See GUS 2010, *Zatrudnienie i wynagrodzenia w gospodarce narodowej w I kwartale 2010 r.* (Employment, Wages And Salaries in National Economy. First Quarter 2010), Warszawa (in Polish).

[39] MPiPS, *Przyczyny pracy nierejestrowanej, jej skala, charakter i skutki społeczne. Wybrane informacje z badań (The Causes of the the Non-Registered Employment, it's Nature and Social Consequences. Some survey results),* Ministerstwo Pracy i Polityki Społecznej, Warszawa 2007, (www.mpips.gov.pl) – in Polish.

minimum wage regulation may be seriously disturbed for this group of workers. This problem is known in the literature on labour market impact of minimum wage regulation. For instance, Neumark and Wascher[40] maintain that in the countries with the large informal sector '*there are serious concerns about the enforcement of and compliance with minimum wage laws*' (p. 105).

CONCLUSIONS

In this article we have tried to verify the hypothesis that minimum wage may be the factor reducing demand for labour in Poland as for instance put forward lately and many times before by the OECD in its recommendations on labour market policy in Poland. We used regional (voivodship) data in our estimations to account for the fact that minimum wage may be binding at least in some regions and therefore there are grounds for regional minimum wage differentiation as also recommended. Our results show that minimum wage legislation might be responsible for reducing employment opportunities in Poland, 1999–2008, only for the group of young (age 15-24 years) workers. Elasticity of employment to minimum wage is consistent with the international literature and should be assessed as rather high. No significant adverse effect of minimum wage on employment has been demonstrated for the total employment or for the least-skilled segment of the labour market. As for the latter, we suppose that shadow economy factor, not taken into account in our study, might have seriously disturbed the results.

As also typical for other countries, our results suggest that minimum wage legislation is not very important for the whole labour market performance but it may create adverse effects for some vulnerable groups, like youths. The other feature of our research, parallel to the international experience, is sensitivity of the results to model specification. Therefore we plan to refine our study by the sensitivity analysis of the stability of parameter estimates in time and across space. We will also experiment with some other specifications of explanatory variables. And since we only touched upon the question of regional differentiation of minimum wage, we will try to add regional analyzes, using time series models and seemingly unrelated regressions methodology.

As for the potential policy recommendations, the main one would be word of caution on further increases of minimum wage, from the point of view of employment prospects of young workers end especially graduates. Unemployment rate in this group is already much higher than average (respectively, 24.6% vs. 10.6%, I quarter 2010, LFS) and – as our results show –

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[40] Neumark, Wascher – *op. cit.*

situation may be aggravated by the future minimum wage rises[41]. Other vulnerable group of the least-skilled workers seem to adjust to minimum wage legislation by transferring their work to the shadow economy. Other results that give reason for policy recommendation are consistently adverse impact of school enrolment and unemployment benefit to wage ratio. As for the former, it partly reflects the increasing propensity to educate among younger generations but it may also be a sign of barriers to employment of students at the labour market in Poland. Relatively low participation by students in the labour market in Poland was pointed out in some previous OECD studies. Therefore, further reforms of both higher education system and labour market to increase economic activity of students will alleviate negative impact of minimum wage on employment, other things equal. As for the latter factor (unemployment benefit to wage ratio), our results suggest that unemployment benefits should not be further increased so as not to deteriorate the work prospects of some vulnerable groups at the labour market. As for the supposition of adjusting the level of minimum wage to local labour market conditions, there is further analyses required to validate or reject it.

(Summary)

The aim of the paper is to verify the hypothesis that minimum wage may have negative impact on employment in Poland, at least for some workers groups and regions. After having reviewed theoretical literature on minimum wage and having discussed stylized facts on minimum wage in Poland, the authors define econometric model to check the impact of minimum wage on employment in Poland and then discuss the results. The main conclusion of the study is that while minimum wage legislation is not very important for the whole labour market performance it may create adverse effects to employment of some vulnerable groups like young workers.

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[41] According to the government proposal, the minimum wage is going to increase by 5.2% since January 1, 2011.