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MACIEJ RYCZKOWSKI[1]

EFFECTS OF BEING IN AN OCCUPATION – IS ISCO 1 DIGIT CLASSIFICATION ENOUGH TO MODEL WAGES IN POLAND?

1. INTRODUCTION

Some analyses of wages are carried out taking into consideration only non-occupational variables that, no doubt, affect wages, however, they lack considerations about the key factor, which is the employee's occupation. This is problematic since occupation should influence the level of wages the most as it reflects the level of responsibility within the company, is often interconnected with appropriate education, qualifications, skills, personality traits and more generally with all the other required at a given post human capital factors. Even the level of education seems secondary in comparison to occupation as education is just a mean by which an individual might increase his or hers chances of getting a better paid occupation. It can be assumed that occupation is a derivative of education, sex (although it should not be), job experience, age (although it should not be), knowledge and skills, and other personal characteristics. Therefore, omitting occupations or their structure (for aggregated data) while determining factors affecting wages might produce less accurate outcomes.

Nevertheless, there are only few empirical studies in Poland concerning the influence of employees' occupations on wages. In turn, those studies which consider the influence of occupations on wages, take into account the impact of occupations aggregated only into 9 big, basic groups (ISCO 1-digit level). Yet, there are no studies explaining the influence of (ISCO) occupations measured at the 2-digit level. The paper fills in this gap. According to the results of the econometric model, the standard deviation of the estimated ISCO 2 digits coefficients is 0.24, which accounts for as much as more than 91% of the arithmetical mean of those coefficients. The huge diversification of the estimated impact of particular occupations on wages is even more visible when considering each of the ISCO 1 digit groups separately. The standard deviation of the estimated ISCO 2 digit occupation coefficients in the group 6 of ISCO 1 digit (i.e. Skilled agricultural, forestry and fishery workers) is more than five times higher than the arithmetical mean of the estimated occupation coefficients

[1] Nicolaus Copernicus University, Faculty of Economic Sciences and Management, The Department of Economics, 13a Gagarina St., 87-100 Toruń, Poland, e-mail: m_ryczkowski@umk.pl; Statistical Office in Bydgoszcz, 86-066 Bydgoszcz, Poland.

within this group –which results in coefficient of variation of more than 600%. In the remaining big ISCO 1 digit groups the situation is remarkably better, but still far from satisfactory. The quotient of the analogous standard deviations to arithmetical means in the remaining ISCO 1 digit groups (i.e. coefficient of variation) varies from 129% (group 5, Service and sales Workers) to 12.6% in group 2. Generally only groups: 2 (Professionals), 3 (Technicians and associated Professional), 4 (Clerical support Workers) and 8 (Plant and machine operators, and assemblers) (i.e. four out of nine ISCO 1 digit groups) experience relatively low variability (measured by the quotient of the analogous standard deviations to arithmetical means), with the coefficient of variation lower than 30%. The obtained results indicate that models of wages basing on ISCO 1 digit might be potentially biased. In the chapter "empirical results" we additionally perform an exercise and estimate the model with only ISCO 1 digit occupations. The results indicate that taking into account occupations at the ISCO 2 digit level should allow to better capture the role of occupations, however this still might be not enough to properly and in detail describe their role (see, Pryor, 2013 for the intra-occupational wage dispersion for the USA at ISCO 4 digit level).

The literature on wage determinants in Poland is very limited. Especially scarce are the papers that explain the level of wages by incorporating ISCO 2 digit variables into the econometric models. The paper fills in this gap and contributes to explaining the still growing diversification of wages even within the same occupation. We believe that our outcomes might be of practical use. Detailed influence of occupations on wages might indicate proper direction of future career of young people and of those who wish to retrain. Moreover, it might be also an information for the government which policies to implement in order to attract young people into the most profitable and wanted in the labour market occupations.

2. LITERATURE REVIEW ON WAGE DETERMINANTS IN POLAND

Previous studies indicate the importance of a firm size, industry, wage-tenure relation, education, gender, age, occupation, race, union membership on the wage differences (see, for example Mortensen, 2003; Mouw, Kalleberg, 2010; Mysíková, 2012). Nevertheless, the impact of particular variables on wage determination in Poland has not gained considerable attention. One of the few papers exploring the impact of occupations on wages in Poland is written in polish '*Czynniki determinujące poziom wynagrodzenia*' by Śliwicki (2012), in which the author constructed a multidimensional logit model on the basis of a significant number of descriptive variables (NUTS 2 regions, nine aggregated groups of occupations, NACE 1 economic activities, levels of education, length of job experience, sex, type of employment contract, size of the establishment, and national and/or sectoral levels of wage bargaining). The study, conducted for the year 2012, proved that belonging to one of nine groups of occupations was statistically significant and influenced the level of wages. The author concluded that also sex (men had higher probability of entering the upper decile group

than women), education (the higher the level of education the greater the chance to enter the upper decile group), type of job contract, and voivodship had statistically significant impact on the level of wages (Śliwicki, 2012).

Another research on wage determinants in Poland (together with the Czech Republic, Latvia, and Lithuania), this time for the year 2002, was carried out by Magda et al. (2011). The authors analyzed a similar to Śliwicki's (2012) set of data, however, they extended the occupation variable to the ISCO 2-digit and industry to NACE 2 levels, but decreased the number of regions to the NUTS 1 level. The authors found substantial differences in earnings across sectors in Poland and the other countries under consideration, even when taking into account a wide range of employee, job, and employer characteristics. The size of the company affected wages in Poland positively from almost 17% (50–249 employees) to almost 27% (1000+ employees). Despite the fact that the authors treated occupations as regressors, the question about the influence of occupations (at the ISCO 2-digit level) on wages remains unanswered as occupational variables were incorporated for the purpose of detailed calculation of economic activities' impact on wages (Magda et al., 2011).

A recent paper on wages in Poland was authored by Cieślik, Rokicki (2013a). Although the authors did not refer to the influence of occupations on the level of wages, using the standard two stage least squares estimation method they ascertained that, in compliance with the New Economic Geography (NEG) approach, economic potential accounts for about one third of the explained wage variation. This leaves room for the impact of individual characteristics, they concluded (Cieślik, Rokicki, 2013a). One of such characteristics is, no doubt, occupation.

Also Brülhart, Koenig (2006) received results in line with NEG. Using regional data for the years 1996–2000, the authors concluded that in the Czech Republic, Hungary, Poland, Slovakia, and Slovenia, market access variables explained up to 43% of the variance in regional fixed effects. This suggests that market access variables are significant explanatory factors of the spatial patterns of wages with high influence of big and capital cities (Brülhart, Koenig, 2006). Notwithstanding, Brülhart, Koenig (2006) did not analyze the possible influence of occupations on the level of wages.

Adamchik, King (2007) found that in 2001 in Poland full-time workers realized on average 86% of their potential earnings. However, their attempt to identify determinants of wages in Poland yielded mixed results for the prepared choice of explanatory variables (Adamchik, King, 2007). Unfortunately neither did their research include occupations, nor posts into the set of explanatory variables.

Another paper that may be added to the list of papers dealing with determinants of wages in Poland was authored by Basu et al. (2005). The authors analyzed wages in Poland (as well as in the Czech Republic, Hungary, and Slovakia) during transition from planned to market economy. Although they obtained interesting results and found little evidence of labor hoarding, they used aggregated data with no division to occupations. As a result, there is no possibility to draw conclusions from this paper on the significance of this crucial wage determinant (Basu et al., 2005).

3. DATA AND METHODOLOGY

The data come from the Structure of Earnings Survey (2012 edition) which is carried out in Poland every two years. The data consist of full and part–time employed persons who worked the whole month in October 2012. Data come from sample survey that covers companies with the number of the employed with 10 persons and more. The exact sampling selection scheme, generalization method and accuracy of the estimates of the selected parameters may be found in (CSO, 2014). Nevertheless some caveats of the research presented in this paper must be noted. First, as from the research are excluded companies with less than 9 employees, the conclusions given in the paper might differ for smaller companies. Secondly, as we measure only those employed, the paper is leaving aside those who are unemployed or who were made redundant. Therefore, any conclusions that, for instance, better education allows to earn more – concerns those who are employed and the impact of education on the *probability* of being employed in companies with more than 9 employees is not considered. Finally, into the research are not included people working on civil contracts and those in unregistered economy – therefore the conclusions are valid only for those in registered economy with full or part-time employment contracts.

The model includes 84 descriptive variables, with gross theoretical monthly wage in October 2012 being the dependent variable. The theoretical monthly wage is designed to allow for better comparisons of wages between particular employees. It is so because the total amount paid to the employee for its job is calculated as a sum of different bonuses, paid over-hours, extra money for a shift work etc. Theoretical wage takes all of them into account. Additionally the variable represents an employee's wage recalculated as if he or she worked the whole month of October (adjustment for breaks due to for example sick leaves, which would otherwise decrease the wage received in the analyzed month) and had full-time employment contract. In case an employee worked less hours in a given month due to for example an illness (and received therefore lower wage), wage is recalculated as if the employee had worked whole month. Moreover, some companies might work slightly different number of days in a month or year and the wage is also appropriately adjusted. For details of how theoretical monthly wage is calculated see appendix 1 and methodological notes in (CSO, 2014). The caveat of using the theoretical monthly wage is however loosing the possibility to verify whether part-time workers receive some wage penalty in comparison to full-time employees. Indeed, empirical results indicate that the penalty exists. For example, Magda et al. (2011) confirmed it for the analyzed Central and Eastern European Countries[2]. In our research it is however not considered.

The descriptive variables include variables that describe personal characteristics and variables representing terms of job agreement. The first set includes age, job experience in the entity, level of education, and sex, while the second set comprises occu-

[2] However, they had no data for Poland.

pation (2-digit ISCO) and type of job agreement (unlimited-term employment contract, limited-term employment contract, task oriented contract or probation contract). As economic activity of the employer is another important factor affecting wages, variables determining economic activities in accordance with the Statistical Classification of Economic Activities NACE Rev. 2, were also incorporated into the model.

Differences in wages between voivodships might be a result of various regional potentials that can be split into social potential (demographic trends, social capital, living conditions), economic potential (gross domestic product per capita, exports, foreign direct investments, innovations, productivity), institutional potential (economic freedom, transaction costs, trust in central and local government actions, share of private ownership), and environmental potential (existence of local labor market areas, tourism, geopolitical indicators, public transportation). (Strategy of socio-economic development for western Poland 2020, 2008). The influence of these potentials on the level of wages was measured by incorporating 16 regional dummies at the NUTS 2 level into the model.

The theoretical model we use takes the form of an extended Mincer (Mincer, 1974) wage regression. Mincer assumed an equalizing differences model of equilibrium wage function:

$$\log y = a_0 + a_1(t - S) + a_2(t - S)^2 + rS + other\ terms, \tag{1}$$

which is known as 'human capital earnings function' (HCEF). $t - S$ stands for years since completion of schooling as t is the age when people finish their earnings with schooling S. The HCEF is often used as a basis for modeling effects of schooling--related factors. However in the more recent literature it is usually proved that cubic or quartic values of $t - S$ years of post-schooling experience give better results. Original Mincer-type regression understates early career earnings growth and overstates mid-career earnings growth (Murphy, Welch, 1990).

To avoid this problem our model takes into consideration years of post-schooling experience as well as its squared (the quadratic experience terms describe the concavity of the earnings profile; see Willis, 1986) and cubic values and takes the form of the following equation[3]:

[3] It must be noted that age is often linked with job experience, which is natural for older workers to had worked more than younger workers. Nevertheless when an individual has breaks in his/her job career than both variables (i.e. age and job experience) might differ. Therefore, we consider in the equation both age and job experience. We do not implement squared and cubed age (as in case of experience) as we would otherwise measure the potential penalty for older (more experienced) workers twice, i.e. people with considerable job experience are also those of appropriately older age. A partial confirmation of this may be that a correlation coefficient between squared age and squared job experience was statistically significant and amounted up to 84%.

$$\ln w_i = \alpha + \beta AGE_i + \sum_{n=1}^{3} \chi_n EXPERIENCE_i^n + \delta EDUCATION_i + \phi SEX_i + \\ + \varphi POST_i + \gamma CONTRACTTYPE_i + \eta NACE_i + \lambda NUTS2_i + \varepsilon_i, \quad (2)$$

where w_i represents the gross theoretical monthly wage of the individual i. AGE, EXPERIENCE, EDUCATION, and SEX represent personal characteristics of the employee. Both age and job experience are measured in years. Eight dummies are included for the level of education and one dummy variable for sex. Thirty four dummies stand for post held within the company, three dummies for contract type, seventeen dummies for type of activity of the company (NACE), and fourteen dummies for the NUTS 2 regions. α, β, χ, δ, ϕ, φ, γ, η, λ are parameters to be estimated and ε_i is the error term. The equation for Poland is estimated by OLS (White, 1980) with heteroscedasticity-consistent standard errors.

4. EMPIRICAL RESULTS

The model was estimated on the basis of 725215 records. Almost all of the considered coefficients are statistically significant at the 1% level (only coefficients for 'task oriented employment contract' and 'cleaners and helpers' are statistically significant at the 10% level, while only Wielkopolskie voivodship turned out to be statistically insignificant), see table 1.

Table 1.

Earnings equations (with ISCO 2 digit occupations) for the year 2012 (model I)

Exogenous variables	Coefficient	Std. error
Intercept	7.127	0.007
Individual characteristics		
Age	0.003	0.000
Job experience	0.024	0.000
Squared job experience	-0.001	0.000
Cubed job experience	0.000	0.000
Higher education (tertiary studies) with a degree of at least doctor	0.464	0.004
Master's degree, physician's degree or any other degree of equal status	0.352	0.003
Higher education (tertiary studies) with engineer's degree, bachelor, economist with diploma or any other degree of equal status	0.220	0.003
Post-secondary	0.115	0.002

Exogenous variables	Coefficient	Std. error
Vocational secondary	0.083	0.001
General secondary	0.096	0.002
Basic vocational	0.008	0.002
Lower secondary	0.071	0.010
Primary and incomplete primary	Ref	Ref
Male	0.155	0.001
Female	Ref	Ref
Kind of job agreement		
Unlimited-term employment contract	0.086	0.005
Limited-term employment contract	-0.034	0.005
Task oriented employment contract	-0.017	0.009
Probation contract	Ref	Ref
Economic activity of the employer		
NACE Rev.2 A, Agriculture, forestry and fishing	0.302	0.006
NACE Rev.2 B, mining and quarrying	0.695	0.004
NACE Rev.2 C, Manufacturing	0.193	0.003
NACE Rev.2 D, Electricity, gas, steam and air conditioning supply	0.403	0.004
NACE Rev.2 E, Water supply; sewerage, waste management and remediation activities	0.193	0.004
NACE Rev.2 F, Construction	0.134	0.004
NACE Rev.2 G, Wholesale and retail trade; repair of motor vehicles and motorcycles	0.103	0.003
NACE Rev.2 H, Transportation and storage	0.162	0.003
NACE Rev.2 I, Accommodation and food service activities	0.037	0.005
NACE Rev.2 J, Information and communication	0.297	0.004
NACE Rev.2 K, Financial and insurance activities	0.300	0.004

Table 1. (cont.)

Exogenous variables	Coefficient	Std. error
NACE Rev.2 L, Real estate activities	0.118	0.004
NACE Rev.2 M, Professional, scientific and technical activities	0.202	0.004
NACE Rev.2 N, Administrative and support service activities	Ref	Ref
NACE Rev.2 O, Public administration and defence; compulsory social security	0.137	0.003
NACE Rev.2 P, Education	0.009	0.003
NACE Rev.2 Q, Human health and social work activities	0.017	0.003
NACE Rev.2 R, Arts, entertainment and recreation	-0.029	0.005
Nace rev.2 S, Other service activities	0.142	0.008
Post held within the company by the employee		
Managers		
Chief executives, senior officials and legislators	1.085	0.005
Administrative and commercial managers	0.761	0.004
Production and specialised services managers	0.670	0.004
Hospitality, retail and other services managers	0.494	0.006
Professionals		
Science and engineering professionals	0.381	0.004
Health professionals	0.447	0.004
Teaching Professional	0.437	0.004
Business and administration professionals	0.424	0.004
Information and Communications technology professionals	0.537	0.005
Legal professionals	0.511	0.005
Technicians and associated Professional		
Science and engineering associated professionals	0.353	0.004
Health associate professionals	0.213	0.005
Business and administration associated professionals	0.289	0.004

Exogenous variables	Coefficient	Std. error
Legal, social, cultural and related associate professionals	0.221	0.006
Information and communications professionals	0.261	0.008
Clerical support Workers		
General and keyboard clerks	0.192	0.004
Customer services clerks	0.138	0.005
Numerical and material recording clerks	0.173	0.004
Other clerical support workers	0.159	0.005
Service and sales Workers		
Personal services workers	0.094	0.005
Sales workers	0.068	0.004
Personal care workers	0.043	0.007
Protective services workers	-0.034	0.005
*Skilled agricultural, forestry and fishery worker*s		
Market-oriented skilled agricultural workers	0.094	0.012
Market-oriented skilled forestry, fishery and hunting workers	-0.159	0.022
Craft and related trades workers		
Building and related trades workers, excluding electricians	0.142	0.005
Metal, machinery and related trades workers	0.257	0.004
Handicraft and printing workers	0.129	0.006
Electrical and electronic trades workers	0.273	0.005
Food processing, wood working, garment and other craft and related trades workers	0.029	0.004
Plant and machine operators, and assemblers		
Stationary plant and machine operators	0.246	0.004
Assemblers	0.198	0.005
Drivers and mobile plant operators	0.179	0.004
Elementary occupations		
Cleaners and helpers	0.013	0.004
Labourers in mining, construction, manufacturing and transport	0.126	0.004
Food preparation assistants	0.038	0.007
Refuse workers and other elementary workers	Ref	Ref

Table 1. (cont.)

Exogenous variables	Coefficient	Std. error
NUTS 2 regions (voivodships)		
Dolnośląskie	-0.036	0.002
Kujawsko-Pomorskie	-0.037	0.002
Lubelskie	-0.099	0.002
Lubuskie	-0.033	0.003
Łódzkie	-0.036	0.002
Małopolskie	-0.014	0.002
Mazowieckie	0.133	0.002
Opolskie	-0.030	0.003
Podkarpackie	-0.127	0.002
Podlaskie	-0.097	0.003
Pomorskie	0.051	0.002
Śląskie	0.017	0.002
Świętokrzyskie	-0.106	0.003
Warmińsko-mazurskie	-0.047	0.003
Wielkopolskie	s.i.	
Zachodniopomorskie	Ref	Ref

$R^2 = 0.53$; adjusted$R^2 = 0.53$; $\bar{y} = 8.15$; st.dev.(y) = 0.530; Ftest(p – value) = 0; V = 6.5%,
Chi-squared(2) = 71067.026(p – value = 0), standard error = 0.36.
Ref stands for reference variable, s.i. stands for statistically insignificant.

Source: own calculations.

According to empirical results, wages increase by 0.3% with every year of life. In line with this result, a minor support may be found for the positive impact of age on wages. In previous empirical studies the influence of age on wages was often positive (see, for example Van Ours, Stoeldraijer, 2010), which by comparing with assumed decreasing productivity of older workers led some to conclusions that older workers are often overpaid (Hellerstein, Neumark, 2004). The issue of joint relations between productivity and age is however behind the scope of this paper.

The impact of job experience on wages is 8 times higher than the impact of age since wages increase by 2.4% per every additional year of job experience. This result confirms that when an employee is more experienced, he or she is more valuable for the employer. It also means that for companies less important is the age of the employee and what matters is the job experience. Hence an increase in age and job experience transfers into increase in wages. The obtained results confirm the concavity

of the observed earnings in line with expectations (see, Mincer 1974), the estimated coefficients of job experience and squared job experience are respectively positive and negative, although with very small value of the second one. Likewise, Magda et al. (2011) found that each year of additional prior potential job experience increased the wage by 3%, which is a little higher value than ours. Nevertheless in their model each additional year of seniority to the company increased the wage by 1.2%. Having considered the lower impact of seniority to the company on wages would probably lower the estimated by us total job experience coefficient to values somehow closer to estimated by Magda et al. (2011). The favorable effect of experience and age found by us and other authors does not, however, eliminate labour-market disadvantages that are also age-related. One must, for example, take into account that people over a particular age may be more prone to redundancy. Having between 50 and 60 years for women and 50 to 65 years for men reduces the probability of being employed by almost 11% (Ryczkowski, 2012). The higher redundancy risk for older people is not measured by this model, as the model takes into account only those employed. Therefore, according to empirical results, an additional 10 years of age and job experience transform into 3% and 24% increase in wages respectively. The estimated coefficients of squared and cubed job experiences are slightly negative and statistically significant. This may mean that older people with substantial job experience are punished on the labour market due to their advanced age, but the estimated penalty is very little. The estimated penalty might be so small due to the mechanism of rewarding faithful employees in line with the efficiency wage theory (Stiglitz, 1974) when the rewarding exceeds any possible negative consequences of age-related productivity downfalls.

Empirical results confirm that sex affects wages at a benefit of men in Poland (Adamchik, Bedi, 2001; Rokicka, Ruzik, 2010; O'Darchai, 2011; Śliwicki, Ryczkowski, 2014). Men receive 15% higher wages than women. On the other hand, Magda et al. (2011) obtained that being a woman decreased wages by 15%. In turn, empirical research by Śliwicki and Ryczkowski (2014) proves that women get wages lower than men's wages by 10.13% to 14.6% due to discrimination depending on the selected methodology. In comparison, the estimated GPG for Poland of Mysíková (2012) was smaller and amounted only to 8.6% on the data set from the year 2008. Both results are however not fully comparable and it cannot be concluded that GPG increased recently. Mysíková (2012) used for the analysis data coming from Labour Force Survey which in terms of wages are less accurate – many data concerning wages miss or are given only in brackets and may be a subject to a survey –bias, however data concerning wages which come from the Structure of Earning Survey (like in the paper of Śliwicki, Ryczkowski, 2014) although are more reliable (as they are gathered from the companies with a resulting from the law obligation to provide them to public statistical services), concern only companies with more than 9 employees. In sum, the result that men receive 15% higher wages than women in Poland is broadly in line with the empirical papers measuring the gender pay gap and may suggest that the pay gap may be higher in companies with more than 9 employees. Nevertheless, it must be

noted that the overall level of *real* discrimination might be lower than the obtained in literature values as a result of sociological, psychological, and social factors that were not taken into account for the quoted decomposition in the analyzed papers.

According to the model, people with master's degree or higher have a considerably greater chance to earn more. The degree of doctor (or higher) increases the wage by 46.4% and master's degree boosts wages by 35.2%. Empirical results confirm that the level of education is a key factor affecting wages and our results are close to the ones of other authors (see, for example: Śliwicki, Zwara, 2012[4]). Likewise, Magda et al. (2011) indicated that the higher the level of education, the greater was its positive influence on wages, with the highest value of 49% for workers with university and non-university higher education. Marcinkowska et al. (2008) ascertained that the difference of wages in Poland between people with higher education and those with primary education increased considerably after the transformation and in the year 1996 amounted already up to 41%, while in 1987 it was only 23%. Our results show that the more educated the potential employee the higher his or hers chance to earn more. Empirical results contest the view of the depreciation of the master degree on the labour market in Poland. By the phrase 'depreciation of a master degree' we mean often raised opinion of a decreasing importance of this title. Such an unfavorable perception resulted from the growing share of population with master degree, especially among young people above 25 and below 30 years old. The share of people with master degree in the population of people above 25 years old is ca. 24% in Poland, while in the bracket of people below 30 years old, the share rises up to over 42%[5]. One must, however, take into account that estimations were carried out on a sample comprising only those employed. Thus, no conclusions can be drawn on the influence of the level of education on the chances for being employed. However, in enterprises where the number of workers is above 10, employees with master's degree are in a remarkably better situation as regards to wages than people with a lower level of education. The reason behind this might be identified by Marcinkowska et al. (2008) the so called skilled biased technical change which increases the demand for qualified labour or the cause may reflect more rapid human capital accumulation and higher returns to job search (Bagger et al., 2014).

Unlimited-term employment contract translates to an 8.6% wage increase. Limited-term employment contract and task oriented employment contract, by contrast, have penalties of –3.4% and –1.7% respectively. Employees falling under one of the two latter options earn less as they are often replacement workers or may have an employ-

[4] Authors find that higher education and having a doctor title altogether increase on average the mean wage in kujawsko-pomorskie voivodship by almost 1404 zlote in comparison to other levels of completed education. It is about 50% of the average wage at that time, which indicate that our estimations undervalue the masters degree, nevertheless Śliwicki and Zwara (2012) used more aggregated measure of education and included into masters degree also people with doctoral and PhD title plus their sample was limited only to one voivodship.

[5] Data for the fourth quarter of 2014. Own calculations basing on Labour Force Survey database.

ment contract for an *implicite* probationary period. After the trial period, when employees prove their worth for the company, they will get a better paid unlimited-term employment contract. Moreover, the form of limited term employment and probationary employment concerns mostly graduates which additionally decreases the level of wages. Also Magda et al. (2011) found that fixed term employment contracts contribute to a wage penalty. The penalty according to the research for selected eastern and western European countries varied between 5.8% for Norway up to 27.4% for Italy. For Poland the penalty for limited term employment contract amounted high 15%. The big gap between our results and those of Magda et al. (2011) may result from different methodologies among which could be included the fact that they verified only two kinds of contracts (unlimited and limited-term employment contract), while we included additionally task oriented employment contracts and probation contracts, also other variables in both models differed. The impact of particular employment contracts on wages in Poland remains then inconclusive.

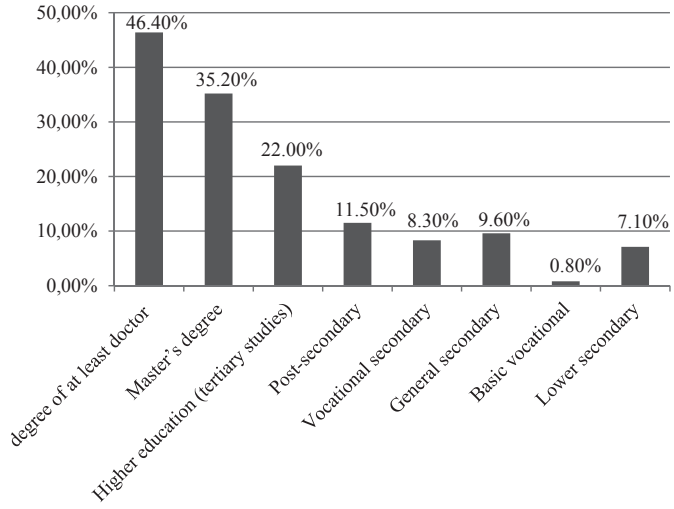

Figure 1. The influence of the level of education on wages in the year 2012

Source: own calculations.

According to the empirical results, we show that in Poland exist strong sectoral wage premia. The reason behind this might be the country-specific degree of corporatism (Magda et al., 2011). In our research mining and quarrying was the economic activity of the enterprise that most prominently boosted wages – by 69.5%. Among the subsequent most favorable economic activities were: 'electricity, gas, steam, and air conditioning supply', 'agriculture, forestry, and fishing', 'financial and insurance activities', 'information and communication'. In comparison, the best paid economic activity – 'public administration and defence together with compulsory social security' – augmented wages by 13.7%. It might seem surprising that 'human health

and social work activities' and 'education' had the weakest influence on wages. One must, however, take into account that more detailed research concerning employers' economic activities would be necessary as each of them consists of specific subsections. Moreover, workers falling under these economic activities represent different occupations and perform different tasks. Education, for instance, comprises teachers as well as cleaners and helpers – one of the worst paid occupational groups. In education the majority of teachers are women, which additionally decreases wages as empirical results indicate that women earn less.

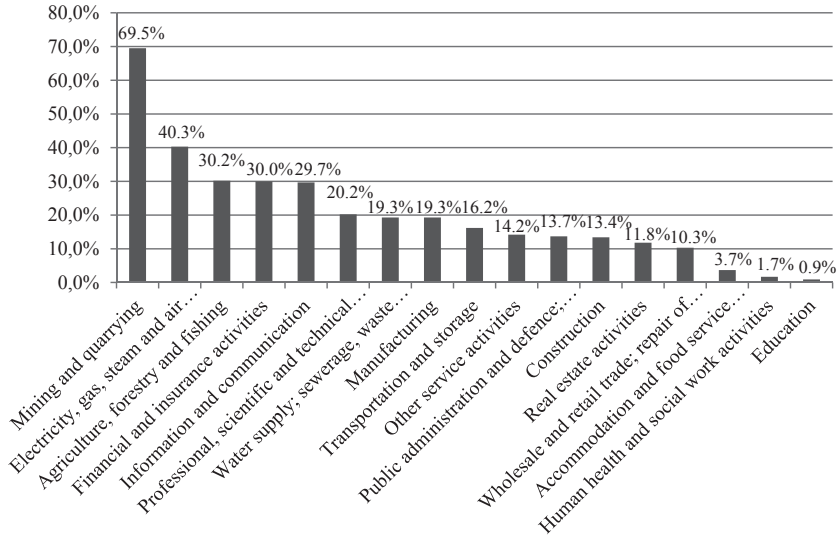

Figure 2. The influence of employer's economic activity on wages in the year 2012

Source: own calculations.

Newell, Socha (2007) found that between 1998 and 2002 the differences between the average wage in population and average wages of managers and those employed in technical professions increased to an considerable extent. In this respect our results confirm the trends in wages observed in earlier studies for Poland. According to our research the best paid group of occupations are managers as the fact of working as chief executive, senior official, or legislator increased wages by 108.5%. Belonging to the other managerial groups also proved beneficial – administrative and commercial managers, production and specialized services managers, and hospitality, retail and other services managers had their wages increased by 76.1%, 67.0%, and 49.4% respectively. Professional, technicians and associated professionals had also considerably increased wages.

Among the worst paid workers were: market-oriented skilled forestry, fishery and hunting workers who had a penalty of –15.9% to their wages and protective services workers who had a penalty of –3.4% to their wages. Working as a cleaner

or helper, sales worker, personal care worker, food preparation assistant increased wages only slightly. Results that brought about similar conclusions obtained Śliwicki (2012). According to his research managers had highest probability to enter the upper decile group. The second most likely group to do so were professionals. However, in comparison to managers, they had a 78.62% lower chance to receive wages from the upper decile group. The worst outcome was achieved by representatives of skilled agricultural, forestry and fisheries workers with a 97.86% lower probability of entering the upper decile group than managers.

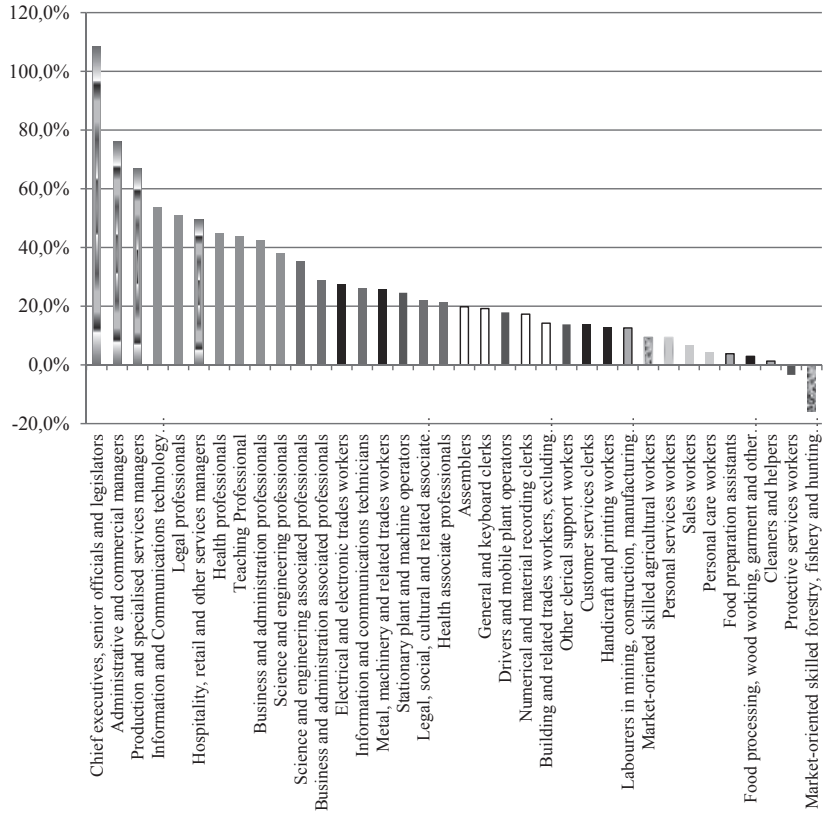

Figure 3. The influence of occupation on wages in the year 2012

Source: own calculations.

Empirical results indicate that occupations at the ISCO 2-digit level have a meaningful and highly variable influence on wages. There could be many reasons explaining this phenomena, like: the diversified level of responsibility, the need to have appropriate education, qualifications, skills, also some other demand factors or more generally human capital factors are of considerable importance. As wage differences at the ISCO 2 digit level are considerable, we assume that models with ISCO 2

digit are superior to those with only ISCO 1 digit as they more accurately capture the role of occupations. To spot that, we perform an exercise and estimate the very same model, however with ISCO 1 digit occupations (estimated coefficients of the model are reported in appendix 2). The general overview is that except for estimated occupation coefficients, the results of both models are quite similar. It is especially visible when comparing the impact of the education, NUTS 2 regions (however, with noticeable exception of Dolnośląskie voivodship) and the kind of job agreement – however in ISCO 1 digit model the bonus for unlimited-term employment contract is 2.6 p.p. higher. Similarly, the fact of being a man increases the wages by 1.9 p.p. higher in ISCO 1 digit model in comparison to the ISCO 2 digit model. In ISCO 1 digit model the estimated coefficients of economic activity of the employer also tend to be somehow higher than in ISCO 2 digit model. The possible explanation could be that not including the wider range of occupations removes the impact of the better paid occupations in each section and thus the premia for being in particular economic activity rises.

Nevertheless, especially meaningful differences between the two models appear when comparing the impact of occupations as ISCO 1 digit model seems not to capture their role as well as ISCO 2 digit model. In ISCO 1 digit model all elementary occupations are the reference value. However, according to ISCO 2 digit model the impact of particular occupations within this group is diversified as cleaners and helpers coefficient amounts to 0.013 while the coefficient for labourers in mining, construction, manufacturing and transport is almost ten times higher: 0.126. The ISCO 1 digit model seems not to capture the role of occupations particularly well in the group of managers. In this group according to ISCO 1 digit model wages are increased on average by 0.71%, however more detailed estimation with ISCO 2 digit variables shows that in the group of managers mostly rewarded are chief executives, senior officials and legislators (109%) while hospitality, retail and other services managers have a bonus more than twice lower (49%). Moreover, group of skilled agricultural, forestry and fishery workers in ISCO 1 digit model turned out to be statistically insignificant, while as this may be true for the whole group, more detailed estimation with ISCO 2 digits reveals that in this group both market-oriented skilled agricultural workers (coefficient: 0.094) and market-oriented skilled forestry, fishery and hunting workers' (coefficient: –0.159) coefficients are statistically significant and additionally the difference between the impact on wages of these two groups in absolute value amounts to more than 25 p.p. A clearly better explanatory properties of ISCO 2 digit model are visible also in the group of service and sales workers with the estimated coefficient of 0.013 in ISCO 1 digit model. ISCO 2 digit model reveals that this group is also not homogenous. Mostly rewarded in this group are personal services workers (0.094) while protective services workers have a penalty to their wages of "minus" 0.034. Also in other ISCO 1 digit groups the differences between both models are noticeable (compare with appendix 2). The least discrepancy between both models appears to be in the group of professionals with ISCO 1 digit model suggesting that this group has on

average a bonus to wages of 39%. However, even here particular occupations are differently rewarded. Mostly rewarded are information and communications technology professionals (0.54%) and least rewarded are science and engineering professionals (38%). In sum, it might be concluded, that models of wages using ISCO 1 digit data might be not enough to properly capture the role of occupations.

According to the estimations, NUTS 2 regions also influenced wages, which is in line with other studies, which indicate for different countries significant inter-regional wage differences among similarly skilled workers. For example, Simón et al. (2006) explain them by both competitive and non-competitive factors, such as an insufficient competition in product markets and industry-level collective bargaining, while Groot et al. (2011) point out to the importance of population density and the total size of the regional labor market to have statistically significant and positive effect on wages. We can observe similar patterns for Poland as in voivodships with the weakest influence on wages we find voivodships with highest unemployment rate, smallest size of regional markets, relatively weaker competition and smallest population density. Mazowieckie voivodship stands out from all of the sixteen voivodships – working in this NUTS 2 region increases wages by 13.3%. Other voivodships have considerably weaker influence on wages. A moderate penalty to wages can be noticed in the eastern voivodships: Podkarpackie, Lubelskie, Podlaskie, and Warmińsko-Mazurskie, where wages are reduced by 12.7%, 9.9%, 9.7%, and 4.7% respectively. Empirical results confirm the existence of differences in the labour market situation between eastern and western voivodships and a relatively strong, positive influence on wages of the Mazowieckie voivodship. The conclusions are thus similar to those of Cieślik, Rokicki (2013b) who obtained that wages decrease as one moves away from the Mazowieckie voivodship[6], as well as from the border with Germany. The results confirm that regional potential might have meaningful impact on wages.

5. CONCLUDING REMARKS

Empirical results indicate that occupations at the ISCO 2-digit level are important factors determining wages. It might be concluded that models of wages basing on ISCO 1 digit data might be not enough to properly capture the role of occupations. The analysis of the econometric model with occupations at ISCO 2 digits (with comparison to analogous model with ISCO 1 digit classification) reveals that the impact of particular occupations on wages within ISCO 1 digit groups may be very diversified. Thus, estimating the impact of occupations on wages only at ISCO 1 digit level may lead to conclusions, which does not have to be necessarily correct for all the detailed occupations within the analyzed ISCO 1 digit group.

[6] Authors find that a 10% increase in distance from Warsaw leads to a 0.6% decrease in the relative average regional wage.

Additionally, in the paper were confirmed many earlier empirical results of the wages' determinants on the example of Poland. The positive influence of occupation on wages seems to increase with the level of work-related responsibility and the unique knowledge of the employee. The occupations with the lowest impact on wages include: forestry, fishery, hunting, and protective services workers, cleaners and helpers as well as food processing workers. The estimated coefficients for food preparation assistants, personal care and sales workers show that these occupations also guarantee little positive influence on wages. As the responsibility grows, wages increase. Those most rewarded are managers, professionals, technicians and associated professionals. It can be noticed that also employees with a high level of work-related responsibility and unique skills, like electrical, electronic, metal, and machinery trades workers as well as stationary plant and machine operators can expect relatively higher wages due to their occupation. The influence of occupation on wages was estimated to vary from –15.9% (for market-oriented skilled forestry, fishery, and hunting workers) to 108.5% (for chief executives, senior officials, and legislators).

The paper confirms that unlimited-term employment contracts are more profitable than probationary and limited-term employment contracts. The analysis supports also the claim that men in Poland earn on average more than women. The paper presents an estimated influence of economic activities on wages as well. The obtained results confirmed that, generally, the higher the completed level of education, the bigger the chances for high wages. Assuming voivodships as proxies for regional potentials, the results confirm that regional potential has impact on wages, however, its influence seems moderate.

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APPENDIX A

Theoretical monthly wage TMW is a sum of TMW_{nom} – theoretical monthly wage paid for nominal time of work (nominal time is the amount of time specified to work according to job agreement, usually 40 hours per week) – (in other words TMW_{nom} is standard remuneration) and payment for overtime work (over-hours) OH:

$$TMW = TMW_{nom} + OH.$$

TMW_{nom} is a sum of theoretical wage paid for nominal time of work in October $TMW^{October}{}_{nom}$ and 1/12 of bonuses, additional annual bonuses for public sector employees, payments due to participation in the profit or budgetary surplus etc.(we will refer to all the additional elements, which increase the basic remuneration as TBN). Moreover, earnings for periods longer than one month are recalculated per a month, i.e. in case of annual bonuses we need to divide TBN by 12:

$$TMW_{nom} = TMW^{October}{}_{nom} + TBN / 12 + OH.$$

Theoretical wage $TMW^{October}{}_{nom}$ is the actual remuneration that an employee received for the performed job in nominal working hours recalculated per full time job:

$$TMW^{October}{}_{nom} = MW^{October} \times \frac{4.6 \times WNH^{FT}}{HP^{October}}.$$

In the upper equation 4.6 is the number of weeks in October, WNH^{FT} is the weekly number of hours delivered by particular occupation assuming working full-time without any breaks in work due to, for example, sick leaves (mostly often WNH^{FT} simply equals 40), $HP^{October}$ is the number of hours paid in October by the company to an employee.

Finally, the theoretical measure of all kinds of let's call it "bonuses", i.e. TBN are all actually received bonuses by an employee BN recalculated per full time job, per uniform number of working days (as they sometimes differ among companies) and adjusted to money paid for economic outage, i.e.:

$$TBN = BN \times AWT^{FT} \times \frac{250}{NWD} / TP^{AN},$$

where AWT^{FT} is the annual number of hours that are to be worked in a given occupation assuming an employee worked full-time, $\frac{250}{NWD}$ is the indicator of the 'number of working days in a year' (mostly often the indicator equals 1 as in most companies number of annual working days NWD is 250), TP^{AN} is the annual time for which the employee received remuneration (paid time) – which is a sum of time actually worked in nominal working hours and time not worked paid minus time spent for economic outages (all time is measured in hours). As a result:

$$TMW = MW^{October} \times \frac{4.6 \times WNH^{FT}}{HP^{October}} + (BN \times AWT^{FT} \times \frac{250}{NWD} / TP^{AN}) / 12 + OH.$$

APPENDIX B

Table 2.

Earnings equations (with ISCO 1 digit occupations) for the year 2012 (model II)

Exogenous variables	Coefficient	Std. error
Intercept	7.149	0.006
Individual characteristics		
Age	-0.001	0.000
Job experience	0.030	0.000
Squared job experience	-0.001	0.000
Cubed job experience	0.000	0.000
Higher education (tertiary studies) with a degree of at least doctor	0.498	0.004
Master's degree, physician's degree or any other degree of equal status	0.369	0.002
Higher education (tertiary studies) with engineer's degree, bachelor, economist with diploma or any other degree of equal status	0.228	0.003
Post-secondary	0.116	0.003
Vocational secondary	0.087	0.002
General secondary	0.099	0.002
Basic vocational	-0.004	0.002
Lower secondary	0.107	0.010
Primary and incomplete primary	Ref	Ref
Male	0.174	0.001
Female	Ref	Ref
Kind of job agreement		
Unlimited-term employment contract	0.112	0.004
Limited-term employment contract	-0.039	0.004
Task oriented employment contract	s.i.	
Probation contract	Ref	Ref
Economic activity of the employer		
NACE Rev.2 A, agriculture, forestry and fishing	0.355	0.005
NACE Rev.2 B, mining and quarrying	0.782	0.003
NACE Rev.2 C, manufacturing	0.255	0.002

Table 2. (cont.)

Exogenous variables	Coefficient	Std. error
NACE Rev.2 D, Electricity, gas, steam and air conditioning supply	0.483	0.004
NACE Rev.2 E, Water supply; sewerage, waste management and remediation activities	0.241	0.004
NACE Rev.2 F, Construction	0.189	0.003
NACE Rev.2 G, Wholesale and retail trade; repair of motor vehicles and motorcycles	0.146	0.003
NACE Rev.2 H, Transportation and storage	0.202	0.003
NACE Rev.2 I, Accommodation and food service activities	0.0754	0.004
NACE Rev.2 J, Information and communication	0.3698	0.004
NACE Rev.2 K, Financial and insurance activities	0.346	0.003
NACE Rev.2 L, Real estate activities	0.167	0.004
NACE Rev.2 M, Professional, scientific and technical activities	0.252	0.004
NACE Rev.2 N, Administrative and support service activities	Ref	Ref
NACE Rev.2 O, Public administration and defence; compulsory social security	0.193	0.003
NACE Rev.2 P, Education	0.053	0.003
NACE Rev.2 Q, Human health and social work activities	0.060	0.003
NACE Rev.2 R, Arts, entertainment and recreation	s.i.	
Nace rev.2 S, Other service activities	0.165	0.008
Post held within the company by the employee		
Managers	0.708	0.003
Professionals	0.387	0.002

Exogenous variables	Coefficient	Std. error
Technicians and associated Professional	0.238	0.002
Clerical support Workers	0.123	0.002
Service and sales Workers	0.013	0.002
Skilled agricultural, forestry and fishery workers	s.i.	
Craft and related trades workers	0.110	0.002
Plant and machine operators, and assemblers	0.142	0.002
Elementary occupations	Ref	Ref
NUTS 2 regions (voivodships)		
Dolnośląskie	0.043	0.003
Kujawsko-Pomorskie	-0.031	0.003
Lubelskie	-0.091	0.003
Lubuskie	-0.036	0.004
Łódzkie	-0.034	0.003
Małopolskie	-0.008	0.003
Mazowieckie	0.134	0.003
Opolskie	-0.025	0.004
Podkarpackie	-0.118	0.003
Podlaskie	-0.094	0.004
Pomorskie	0.049	0.003
Śląskie	0.021	0.003
Świętokrzyskie	-0.099	0.004
Warmińsko-mazurskie	-0.053	0.003
Wielkopolskie	-0.005	0.003
Zachodniopomorskie	Ref	Ref

R-squared: 0.516614, Adjusted R-squared: 0.516578.
Ref stands for reference variable, s.i. stands for statistically insignificant.

EFEKT WYKONYWANEGO ZAWODU – CZY WYKORZYSTYWANIE KLASYFIKACJI ISCO NA POZIOMIE JEDNEJ CYFRY WYSTARCZA, ŻEBY MODELOWAĆ WYNAGRODZENIA W POLSCE?

Streszczenie

W przeciwieństwie do neoklasycznych założeń doskonałej konkurencji istnieje konsensus, że do czynników wpływających na wysokość uzyskiwanego wynagrodzenia zaliczyć należy płeć, poziom wykształcenia, wiek, doświadczenie zawodowe, wykonywany zawód, posiadane stanowisko, stopień odpowiedzialności związanej z wykonywaną pracą oraz cały zestaw indywidualnych cech osobowościowych. W artykule posługując się Międzynarodową Klasyfikacją Zawodów i Specjalności (ISCO) na poziomie 2 cyfr uzyskano oceny parametrów strukturalnych modelu, które pozwalają wyjaśnić różnice wynagrodzeń w Polsce. Na podstawie przeprowadzonej analizy stwierdzono, że wykonywany zawód, mierzony na poziomie ISCO 2 cyfry jest ważną i statystycznie istotną zmienną oddziałującą na wysokość uzyskiwanego wynagrodzenia w Polsce. Modelowanie wynagrodzeń wykorzystujące klasyfikację ISCO, ale ograniczoną tylko do poziomu 1 cyfry, może być niewystarczające, aby prawidłowo uchwycić znaczenie wykonywanego zawodu dla uzyskiwanego wynagrodzenia.

Słowa kluczowe: determinanty wynagrodzeń, modelowanie wynagrodzeń, zawody, znaczenie wykonywanego zawodu

EFFECTS OF BEING IN AN OCCUPATION – IS ISCO 1 DIGIT CLASSIFICATION ENOUGH TO MODEL WAGES IN POLAND?

Abstract

Contrary to neoclassical assumptions of perfect competition, there is a consensus that factors affecting wages include sex, level of education, age, job experience, occupation, post, work-related responsibility and a whole set of personality traits. The paper presents an econometric model that allows to explain wage differences in Poland and extends analyses of wage determinants in Poland by taking into account occupations broken down in accordance with the 2-digit level of International Standard Classification of Occupations (ISCO). The analysis shows that ISCO 2 digit level is an important and statistically significant determinant of wages in Poland, while models of wages basing on ISCO 1 digit might be not enough to properly capture the role of occupations.

Keywords: determinants of wages, wages modeling, occupations, importance of occupation